



ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT (ESIA) STUDY REPORT FOR THE PROPOSED FORCES REFERRAL AND RESEARCH HOSPITAL (FRRH) KABETE BARRACKS ON LAND L.R. NO. 209/12348 – WESTLANDS NAIROBI CITY COUNTY – REF. NEMA/TOR/5/2/468.

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CHINA WU YI (K) CO., LTD.



DOCUMENT AUTHENTICATION

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NAME AND CONTACT ADDRESSES OF EIA/EA FIRM OF EXPERTS:

iPlan Consult (Intl) LTD (NEMA REG NO: 7597),
P.O BOX 28634-00100, NAIROBI.
TEL: 02022251702 / 0203546499 CELL: 0721891005
Email: sk.mbuta@gmail.com/iplanconsult1@gmail.com

Signature.....Date.....

SHADRACK K. MBUTA (EIA/ EA Expert Reg. No. 6315).

NAME AND CONTACT ADDRESSES OF PROCURING ENTITY

Ministry of Defense (MoD),
P.O Box 40668-00100, Nairobi, Kenya.
TEL No.254-20-2721100 ext. 5741 Fax No 254-20-2725854

Signature.....Date.....

TABLE OF CONTENTS

TABLE OF CONTENTS	iii
ACRONYMS AND ABBREVIATIONS	vii
LIST OF FIGURES	ix
LIST OF TABLES	ix
LIST OF PLATES	ix
EXECUTIVE SUMMARY	x
CHAPTER 1	23
1. INTRODUCTION	23
1.1 Prelude to the Ministry of Defence	23
1.2 Project Background	23
1.4 Project Objectives	26
1.5 ESIA Objectives	26
1.6 Terms of Reference (ToRs) For the ESIA	27
1.7 Methodology of the ESIA study	27
1.7.1 Desk Review	28
1.7.2 Field Study	28
1.7.3 Data Synthesis	28
1.7.4 Reporting	28
1.8 Project Budget	28
1.9 ESIA Team Members	29
CHAPTER 2	30
2. PROJECT DESCRIPTION	30
2.1 Introduction	30
2.2 Existing Site Facilities	30
2.2.1 Site clearance	30
2.2.2 Construction Progress	31
2.2.3 Buildings to be retained	32
2.3 The Proposed Project	32
CHAPTER 3	43
3. BASELINE ENVIRONMENTAL INFORMATION	43
3.1 Administrative Location	43
3.2 Demography	45
3.3 Climate and Temperature	45
3.4 Physical and Topographic Features	46
3.4.1 Topography	46
3.4.2 Flora	47
3.4.3 Fauna.....	47
3.4.4 Water resources.....	47
3.4.5 Geology & Soils.....	48
3.4.6 Hydrogeology	48
3.4.7 Ambient Air Quality at project site.....	49
3.4.8 Noise Level measurements at project site.....	50
3.5 Infrastructural facilities	51

3.5.1 Electricity	51
3.5.2 Water & Sewerage	51
3.5.3 Transport Network	52
3.5.3.1 Airports	54
3.5.3.2 Railway Network	54
3.5.4 Health	55
3.5.5 Land Use	55
CHAPTER 4	57
4. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK	57
4.1 General	57
4.2 Legal Framework	61
4.3 Regulatory Framework	75
4.3.1 National Environment Management Authority, NEMA	75
4.4 International Conventions and Protocols	75
4.4.1 Basel Convention	75
4.5 International Finance Corporation (IFC) Performance Standards/World Bank ESSs	75
CHAPTER 5	78
5. POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES	78
5.1 Introduction	78
5.2 Impact identification	78
5.2.1 Sources of impacts	78
5.2.2 Receptors of impacts	79
5.3 Impact Assessment criteria	80
5.4 Environmental Impacts and mitigation measures	82
5.4.1 Impacts of obtaining construction materials	83
5.4.2 Generation of Wastes impacts	84
5.4.3 Surface and ground water quality impacts	87
5.4.4 Soil erosion and storm water impacts	89
5.4.5 Biodiversity Impact	90
5.4.6 Air Pollution	91
5.4.7 Noise Impact	93
5.4.8 Traffic Impact	94
5.4.9 Health, Safety and Security impacts	96
5.4.10 Visual Impact	98
5.4.11 Increased Water Demand	100
5.4.12 Increased demand on Energy	101
5.4.13 Social and Labour Issues	102
5.4.14 Indigenous Peoples	102
5.4.15 Cultural Heritage	103
5.5 Environmental Impacts and Mitigation measures for associated facilities	103
5.5.1 Waste Water Treatment Plant	103
5.5.1.1 Introduction	103

5.5.1.2 Potential Environmental Impacts Associated with WWTPs	103
5.5.2 Medical Waste Incinerator	105
5.5.2.1 Introduction	105
5.5.2.2 Environmental, health and safety Risks associated with Waste Incinerators	106
5.5.3 Batching Plant	107
5.5.3.2 Environmental Risks Associated with the operation of Batching Plants.....	108
5.5.4 Mortuary	109
5.5.4.1 Introduction	109
5.5.4.2 Environmental, health and safety risks associated with mortuary	110
CHAPTER 6.....	112
6. ENVIRONMENTAL AND SOCIAL IMPACT MANAGEMENT.....	112
6.1 Introduction.....	112
6.1.1 General	112
6.1.2 Scope and Objectives of the ESMP	112
6.1.3 Applicable Legislation	113
6.2 Environmental Awareness	113
6.3 Mitigation.....	113
6.4 Responsibilities in Environmental and Social Management.....	113
6.4.1 General	113
6.4.2 Responsibility of KDF	114
6.4.3 Responsibility of the Contractor	115
6.4.4 Responsibilities of Regulatory Agencies	116
6.4.5 Responsibility of the Environment, Health and Safety Supervisor (EHSS)	116
6.5 Construction Phase Environmental Management Plan	118
6.6 Operation phase Environmental Management Plan	126
6.7 Environmental and Social Management Plan (ESMP) for Associated Facilities	131
These facilities include WWTP, Incinerator, Batching Plant and Mortuary	131
6.7.1 EMP for Waste Water Treatment Plant	131
6.7.2 Environmental Management Plan for Incinerator.....	133
6.7.3 Environmental Management Plan for Batching Plant	134
6.7.4 Environmental Management Plan for the Hospital Mortuary.....	136
6.8 Environmental Monitoring	139
6.8.1 General	139
6.8.2 Project parameters to be monitored	139
6.8.3 Effluent discharge Monitoring into Public sewers.....	140
6.8.4 Incinerator Monitoring (Air Emissions)	141
CHAPTER 7 PUBLIC PARTICIPATION	143
7. STAKEHOLDER ENGAGEMENT ACTIVITIES UNDERTAKEN AND FUTURE PLANS	143
7.1 Introduction	143
7.2 Public Consultation Framework Adopted	143
7.2.1 Direct one on one interviews	143
7.2.2 Questionnaire administration	144
7.2.3 Public Consultation Meeting.....	144

7.2.4	Media	144
7.3	Stakeholders Mapping	144
CHAPTER 8		148
8. Grievance Redress Mechanism		148
8.1 Introduction		148
8.2 Grievance Process		148
CHAPTER 9		149
9. DECOMMISSIONING		149
9.1 Introduction		149
9.2 Purpose and objectives of decommissioning		149
9.3 Decommissioning at the end of construction phase		149
9.3.1 General.....		149
9.3.2 Decommissioning and site restoration activities.....		149
9.3.3 Demolition and disposal of materials from the construction site		150
9.4 Decommissioning at the end of project life cycle		151
REFERENCES		152
ATTACHMENTS TO THE REPORT		154
Attachment1: Ambient Air Quality Monitoring Report		154
Attachment 2: Ambient Noise Level Monitoring Report		154
Attachment 3: Labour Management Plan		154
Attachment 4: Traffic Impact Assessment Report		154

ACRONYMS AND ABBREVIATIONS

CAU	Camp Admin Unit.
CCTV	Closed Circuit Television.
CDF	Chief of the Defence Forces
CPD	Continuous Professional Development.
CT	Computed Tomography.
DECT	Digital Enhanced Cordless Technology
DFMH	Defence Forces Memorial Hospital
DOSHS	Directorate of safety and health services
ECG	Electrocardiogram
EFTPO	Electronic Funds Transfer at Point of Sale.
EHS	Environmental Health and Safety
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EMCA	Environmental Management and Coordination Act
EMP	Environmental Management Plan
EP	Electrophysiology
EMMP	Environmental Management and Monitoring Plan
ESMP	Environmental and Social Management Plan
ESS	Environmental and Social Standards
GBV	Gender-Based violence
HEPA	High Efficiency Particulate Arrestance.
HMIS	Health Management Information Systems
ICSI	Intracytoplasmic Sperm Injection.
ICU	Intensive Care Unit.
IVF	In Vitro Fertilization
IFC	International Finance Corporation
ILO	International Labor Organization
KBS	Kenya Bureau of Standards
KDF	Kenya Defense Forces
KNBS	Kenya National Bureau of Statistics
KPLC	Kenya Power and Lighting Company
KRA	Kenya Revenue Authority
KFRRH	Kenya Forces Referral & Research Hospital
KURA	Kenya Urban Roads Authority
KRC	Kenya Railways Corporation
LIMS	Laboratory Information Management System
LMP	Labour Management Plan
LPG	Liquefied Petroleum Gas
NCWSC	Nairobi City Water and Sewerage Company
M&E	Monitoring and Evaluation
MoD	Ministry of Defence
MoH	Ministry of Health
MRI	Magnetic Resonance Imaging

NEMA	National Environment Management Authority
NEAP	National Environmental Action Plan
NICU	New-born Intensive Care Unit
NIS	National Intelligence Service
NPS	National Police Service
OR	Operating Room
PABX	Private Automatic Branch Exchanges.
PACS	Picture Archiving Communications Systems
PAS	Patient Administration Systems.
PECC	Psychiatric Emergency Care Centre.
PET	Positron Emission Tomography.
PIU	Project Implementation Unit
PS	Performance Standard
PWDs	Persons with Disabilities
RAF	Royal Air Force
SEA	Sexual Exploitation and Abuse
SH	Sexual Harassment
SCN	Special Care Nursery.
SPECT	Single Photon Emission Computed Tomography
TCV	Troop Carrying Vehicle.
TOE	Trans-Esophageal Echocardiography.
TOR	Terms of Reference
TTE	Trans-Thoracic Echocardiography.
UHC	Universal Health Coverage
UN	United Nations
USB	Universal serial Bus
VIPs	Very Important Persons
WB	World Bank
WI-FI	Wireless Fidelity
WHO	World Health Organization

LIST OF FIGURES

Figure 1: Visual Plan of the Project.....	25
Figure 2: The Kenya Forces Referral and Research Hospital (KFRRH-Kabete) Site Plan.....	33
Figure 3: Operating Unit Dual Corridor Model.....	37
Figure 4: Air Pressurization Diagrams: Operating Unit	38
Figure 5: Scheme of proposed burns unit	39
Figure 6: Westlands Constituency, Nairobi County (Source: www.softkenya.com)	43
Figure 7: Showing Proposed site on context of Nairobi County Map	44
Figure 8: The Nairobi Express Way Map (Source: https://res.cloudinary.com)	53
Figure 9: Proposed site and neighbourhood showing different land uses.	56

LIST OF TABLES

Table 1.1: Team Members	29
Table 3.1: Population distribution in Westlands Constituency.....	45
Table 4.1: The Constitution of Kenya and National Policies	57
Table 4.2: Relevant Legal Framework.....	61
Table 4.3: IFC Performance Standards/World Bank ESSs relevant to the project.....	76
Table 5.1: Assessment of significance of environmental impacts	82
Table 6.1: Environmental Management Plan for the construction phase	119
Table 6.2: Operational phase Environmental Management plan.....	126
Table 6.3: EMP for Waste Water Treatment Plant	131
Table 6.4: Environmental Management Plan for Incinerator	133
Table 6.5: Environmental Management Plan for Batching Plant	134
Table 6.6: Environmental Management Plan for the Mortuary	136
Table 6.7: Monitoring plan	139
Table 6.8: Standards for effluent discharge into Public sewers.....	141
Table 6.9: Incinerator Monitoring Guidelines	141
Table 8.1: Decommissioning at the end of construction phase	150

LIST OF PLATES

Plate 1: Part of the remaining Building to be demolished	30
Plate 2: Construction status at the Accident and Emergency Block	31
Plate 3: The Covid 19 disease Management Centre	32
Plate 4: Terrain around the site (showing the hilly areas of Kitisuru at the background)	46
Plate 5: A tributary of the larger Mathari River about 1km from the site.	48
Plate 6: Ambient Air Quality and Noise level measurements at the site	50
Plate 7: Waiyaki Way and the Express Way (Project site to the left).....	54

EXECUTIVE SUMMARY

Environmental and Social Impact Assessment, (ESIA) has been identified as a key process for predicting and assessing the potential environmental and social impacts of a proposed project, evaluating alternatives, designing appropriate mitigation, management, and monitoring measures. It starts at the conceptual design stage of a project and continues throughout project construction, operation and decommissioning. During the process, several deliverables are prepared to guide the activities of the specific stage. Early identification of possible development impacts to the environment and human populations enhances and promotes environmental sustainability. The purpose of an ESIA is to identify the positive and negative impacts caused by project implementation. This is assessed through an analysis of the effects resulting from interaction between environmental and social components and the various activities of a project and its development.

The International Finance Corporation (IFC); one of the constituent and complimentary organizations of the World Bank requires an environmental and social assessment (ESA) of projects proposed by borrowers for Bank financing to help ensure that they are environmentally and socially sound and sustainable, and thus to improve decision making. The Bank undertakes environmental and social screening of each proposed project to determine the appropriate extent and type of environmental and social assessment.

The Government of Kenya is committed to improving welfare of the country's security sector for better services and this is being achieved through healthcare reforms for the disciplined forces that are in tandem with the Government's agenda on Universal Health Coverage (UHC) which has also witnessed improvements in the services offered to the civilian population. In light of this, The Ministry of Defence has invested heavily in health facilities strategically across the country in line with the UHC pillar of the Big 4 Agenda, an economic blueprint developed by the government of Kenya to foster economic development and provide a solution to the various socio-economic problems facing Kenyans.

The Ministry of Defence intends to construct the Kenya Forces Referral and Research Hospital (FRRH) within Kabete Barracks on Land L.R. No. 209/12348, Westlands Nairobi City County. This facility will provide Level VI specialised care services and is expected to complement the Defence Forces Memorial Hospital (DFMH) which is the sole referral hospital for security forces in Kenya.

As per the World Bank guidelines, this project falls under Category B projects whose development and operation is likely to result to potential adverse environmental impacts on human populations

or environmentally important areas—including wetlands, forests, grasslands, and other natural habitats. The impacts are site-specific; few if any of them are irreversible; and in most cases mitigatory measures can be designed more readily. Category B EA project examine the project's potential negative and positive environmental impacts and recommends any measures needed to prevent, minimize, mitigate, or compensate for adverse impacts and improve environmental performance.

Background to the project

The right to health is a fundamental human right guaranteed in the Constitution of Kenya. Article 43 (1) (a) of the Constitution provides that every person has the right to the highest attainable standard of health, which includes the right to health care services, including reproductive health care. The Government of Kenya is committed to improving welfare of the country's security sector for better services and this is being achieved through healthcare reforms for the disciplined forces that are in tandem with the Government's agenda on Universal Health Coverage (UHC) which has also witnessed improvements in the services offered to the civilian population. The increase in Kenya's security forces operations has led to increased requirements for medical and surgical care. Similarly, the increase in the prevalence of non-communicable diseases like cancer and heart disease has led to a dire need for diagnostic and treatment equipment such as oncology and cardiology services, which are currently not available within Kenya Defence Forces (KDF) medical facilities.

The Kenya Ministry of Defense (KMOD) intends to commence construction of the Kenya Forces Referral and Research Hospital (KFRRH), which is a key Government of Kenya priority project within Kabete Barracks, Nairobi. KDF has identified the ideal location of the proposed project to be within Nairobi County, Westlands Constituency at the Current Kabete Barracks ground. The Barracks located along Waiyaki Way, seats on a KMOD-owned property approximately 9 km to the West of Nairobi City's CBD with a total area of approximately 30 Acres (12.409Ha) and being Land L.R. No. 209/12348, Westlands Nairobi City County. The main objective of the project is to provide Level VI specialised medical care and referral services to all uniformed personnel including the KDF and other Government Security Agencies (NPS, APs, Kenya Prisons, NIS), NYS, KWS, Senior Government Officers, VIPs, KDF retirees, veterans etc.



Figure 1: Site Locational and Context to Nairobi County.

Brief Description of the Project

The proposed development shall be composed of the main hospital with approximately 700bed capacity facility, Associated Facilities (Oxygen generating plant, Waste water treatment plant, Medical waste incinerator and Mortuary) and Camp Administrative Unit (CAU). Blocks 1-4 will comprise the main hospital with Block 5 hosting the medical school complex. The rest of the buildings shall form the CAU (Camp Administration Unit) to provide logistical support and services to the hospital, officers and service members such as Messes and Accommodation.

1. THE MAIN HOSPITAL

Block No. 1#: OUTPATIENT CLINIC- This is a 6 Floor Block to offer all outpatient services comprising the Main Entrance Unit, Public and staff amenities, Outpatient Pharmacy, Medical Imaging Unit

Block No. 2#: ONCOLOGY CENTER – This will be a 4 Floor Block to offer all oncology services including Oncology & Radiation Unit as well as Community Health Unit.

Block No. 3#: SPECIALIZED CARE BLOCK – A 5 Floor Block accommodating the Emergency unit, Mental Health Inpatient unit, Biomedical Engineering & Maternity Unit

Block No. 4#A: INPATIENT BUILDING – An 11 Floor Block comprising Catering Unit, Equipment, Burn Unit, Maternity Unit and Intensive Care Unit,

Block No. 4#B: INPATIENT BUILDING – This is 13 Floor Block comprising of Supply Unit Equipment, Admissions and Discharge unit, medical records room, pharmacy, Coronary care unit (32 beds), ICU and HDU and a Roof Floor that will have Helipad for landing of helicopters and powered lift aircrafts.

Block No. 5#: MEDICAL SCHOOL COMPLEX – This is a 7 Floor Block that shall be mandated to offer medical training to KDF personnel. It shall house the school training unit as well as Accommodation.

2. **CAMP ADMINISTRATIVE UNIT (CAU) – This shall comprise of units** to provide logistical support and services to the hospital, officers and service members such as Messes and Accommodation.

3. ASSOCIATED FACILITIES

The construction and operation of the hospital will see erection of several other associated facilities. These facilities include but not limited to Waste Water Treatment Plant (WWTP), Incinerator, Concrete Batching Plant and Mortuary. These facilities are unique and may pose other challenges and impacts that require special handling.

MORTUARY UNIT – This forms part of the associated facilities for the hospital establishment

WASTE HANDLING UNIT – This is a 2 floor Block unit for proper management and disposal of waste.

WASTE WATER TREATMENT PLANT – This facility shall ensure treatment of wastewater and remove pollutants

OXYGEN GENERATING PLANT - Given the nature of the hospital, its size and its specialty; the hospital will have its own Oxygen generating plant to ensure constant Oxygen supply.

- **WWTP**

The proponent intends to construct a Waste Water Treatment Plant (WWTP) that will be designed according to the quality (Chemical, physical and bacteriological characteristics) and quantity of waste water to be treated per day, method of treatment to be used, sludge quantity and quality and method of sludge treatment and disposal.

The WWTP shall be constructed according to the design and site layout plan and guided and supervised by the contractor's consultant civil & structural engineers. It is proposed that treated waste water will be discharged into the public sewer system.

The construction and operation of the WWTP shall comply to the existing national guidelines and legislation.

- **Medical waste incinerator**

An incinerator with specifications of handling the expected Volume of clinical waste shall be installed at site to manage waste from the proposed health facility. The proponent is in the process of sourcing and purchasing an appropriate incinerator for the proposed hospital. EMCA 2006 (waste management) Regulations classifies incinerators and the most appropriate for the disposal of waste that contains hazardous, potential hazardous and bio-medical waste where the operator exceeds 100 Kg/day is classified under Class 2A (Commercial Incinerators). These regulations stipulate the standards, guidelines, criteria, procedure for installing/operating incinerators.

- **Batching Plant**

The project contractor "China Wu Yi" has installed a batching plant on site to manufacture concrete for the construction of the proposed buildings/structures. The batching plant is temporal and shall be decommissioned upon completion of the construction activities.

The batching has already been set up and the contractor shall be obliged to comply to the existing national guidelines and legislation including the EMC (Air Quality) Regulations 2014, EMC (Water Quality) Regulations 2006, EMC (Waste Management) Regulations 2006, Public Health Act Cap 242 Laws of Kenya, Occupational Safety and Health Act (OSHA) 2007 among others (Refer to Chapter 4 of the ESIA Report).

- **Mortuary**

The proposed Hospital Mortuary shall provide a facility for autopsy, embalming, storage, viewing and/or identification and casketing of bodies. A storage capacity of 60 bodies shall be provided for regular use with an additional disaster contingency of 40 bodies. The acceptable average temperature within a normal body cabinet or refrigerated room shall be maintained between 2.0°C and 6.0°C. Separate body cabinets shall be provided for long-term storage of bodies at a lower temperature (-20°C) than would be the case in a refrigerated room.

The proposed mortuary shall be constructed and operated in compliance to the existing national guidelines and legislation including the EMC (Air Quality) Regulations 2014, EMC (Water Quality) Regulations 2006, EMC (Waste Management) Regulations 2006, Public Health Act Cap 242 Laws of Kenya, Occupational Safety and Health Act (OSHA) 2007, Sustainable Waste Management Act 2021 (Refer to Chapter 4 of the ESIA Report).

Assessment of Alternatives

Project alternatives in terms of site (location) selection, project design alternatives and no project option alternatives were taken into consideration.

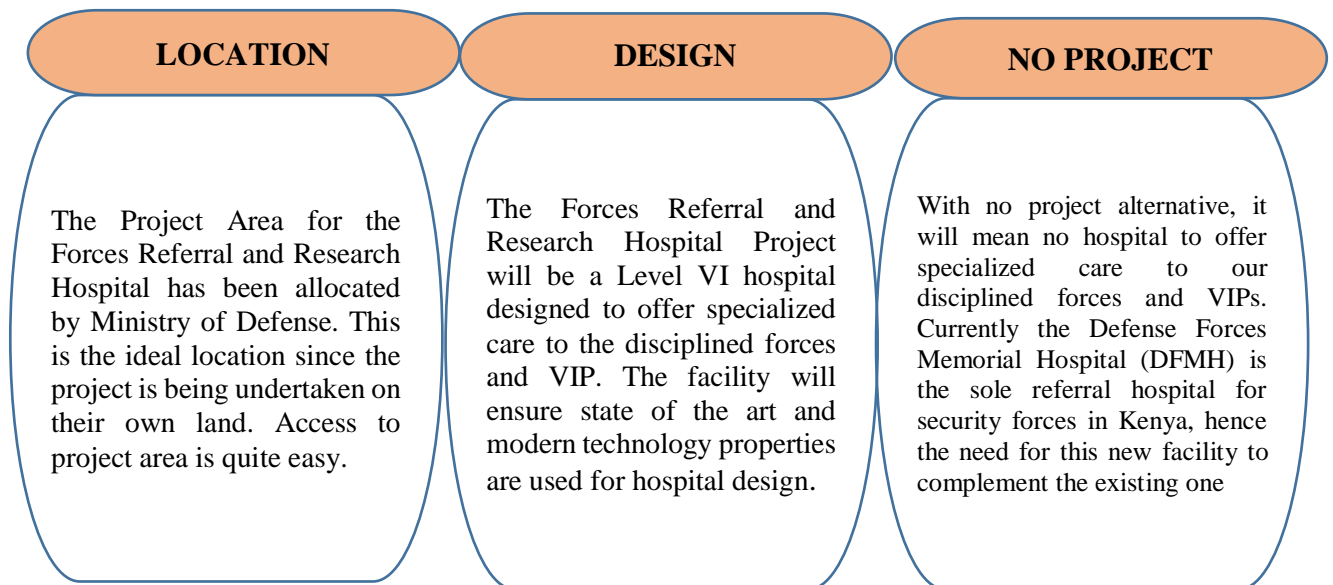


Figure 2: Project Alternatives

From the analysis above, it becomes apparent that the No Project alternative is not the best option to the disciplined forces, VIPs and the government of Kenya.

Institutional Framework

This ESIA for the proposed Forces Referral and Research Hospital-Kabete was conducted under the following national Policy, Legal and Administrative Framework that are applicable to the implementation, operation and decommissioning phases of the proposed project. In addition, relevant international conventions, agreements and protocols have also been discussed.

Policy instruments

- The Constitution of Kenya
- The National Environment Policy, 2013
- Vision 2030 Kenya
- Health Care Waste Management Strategic Plan 2015-2020
- National Infection Prevention and Control Guidelines for Health Care Services in Kenya, 2010
- National Land Policy of 2009
- The National Environmental Action Plan (NEAP) 2009 -2013.

Legal Framework – Some of the legal framework applicable to this project include: -

- Environmental Management and Coordination Act (EMCA), 1999
- Environmental Impact Assessment and Audit regulations 2003.
- The Physical and Land Use Planning Act, 2019
- County Government Act 2012
- The Water Act 2016
- The Land Act 2012
- The Environmental Management and Coordination (Air Quality) Regulations 2014
- Occupational Safety and Health Act (OSHA), 2007 Cap 514 Laws of Kenya

Regulatory Framework

- **National Environment Management Authority, NEMA**

NEMA is the regulatory body charged with management and coordination of environmental issues. The object and purpose for which the Authority was established is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government in the implementation of all policies relating to the environment.

Regulatory function

- Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plans, programmes and projects.
- Identify projects and programmes or types of projects and programmes, plans and policies for which environmental audit or environmental monitoring must be conducted under this Act;
- Monitor and assess activities, including activities being carried out by relevant lead agencies, in order to ensure that the environment is not degraded by such activities.

- **International Conventions and Protocols**

- **Basel Convention**

The Basel convention on the control of Transboundary movement of hazardous wastes and their disposal is an international treaty that was designed to reduce the movement of hazardous wastes between nations and specifically prevent transfer of hazardous waste from developed to less developed countries. The convention is also intended to minimize the amount of toxicity of wastes generated to ensure their environmentally sound management as closely as possible to the source of generation and to assist the less developed countries in environmentally sound management of hazardous and other waste they generate.

- **International Finance Corporation (IFC) Performance Standards/World Bank ESSs**

The International Finance Corporation (IFC) Performance Standards/World Bank Environmental and Social Standards (ESSs) are designed to give guidance to the proponent to better manage the risks and impacts of proposed projects. The outcome of the analysis of

performance standards ensures that the proposed projects are accepted, are environmentally and socially sustainable, and informed decision in regard to projects is made.

The project implementation will see deployment of four category of workers as defined by the Environmental and Social Standard -2 of the World Bank. They include (i) direct employees from the ministry and all consultants (ii) People employed or engaged through third parties to perform work related to core functions of the project, regardless of location (contracted workers); (iii) Primary suppliers of materials such as sand, cement, timber etc. and (iv) Local community workers who will be engaged as casuals in the construction process as masons, plumbers, electricians, cleaners among other cadres of employment.

The project will be implemented as per the national laws governing employment and labor relations in Kenya in addition to the provisions of the ESS-2 of the World Bank. Relevant legal framework includes the (i) employment Act ,2007 (ii) Work Injuries and Benefits Act (2007) (iii) Occupational Safety and Health Act (2007) and (iv) the penal code (cap 63 laws of Kenya).

Summary of Major Impacts and Proposed Mitigation Measures

Environmental management and EIA helps in creating a sound foundation for effective environmental management of a project. This is achieved through minimization of adverse impacts and enhancement of positive impacts on people and environment through a comprehensive analysis of the entire chain of project operations. For this, EIA should not be treated merely as a tool for regulatory compliance but as an instrument for improving ‘project management’ per se with proper expertise, time, and budget allocations made for the purpose.

Impacts of obtaining construction materials

Opening up of quarries to obtain aggregates and rocks, deliveries of materials to the site have various impacts which are long term in nature. With mitigation measures, the significance of the impacts will be reduced to low.

Mitigation Measures

- Maximize the re-use of excavated materials in the works, as fill.
- Selection of quarries and borrow pits sites should be done carefully so as to minimize impacts on existing land uses.
- Strip all available topsoil from borrow pits and quarries and store it safely for use in site restoration.
- Close all borrow pits and quarries in accordance with an approved plan to maximize their long-term biological productivity and minimize health and safety hazards.
- Carry out EIA for quarry site if new quarries are to be opened for purposes of this project

Generation of Wastes impacts

Medical waste generation from the facility is of paramount significance and should be managed according to industry standards. Among the wastes to be generated include;

Mitigation measures

- **General Waste** – from places that healthy persons live, First aid areas. Administrative offices, housekeeping, kitchen, warehouses and waste from workshops
- **Packaging Waste** – Reused recycled waste (such as paper, cardboard, paperboard, plastic, glass, metal. etc.) from all administrative offices, kitchen, warehouse, workshop
- **Medical Waste (Infectious Waste)** – Microbiological laboratory waste (Culture and inventories, infectious body fluids, serological waste and other contaminated laboratory waste. etc.). Blood products and contaminated with these objects, used surgical clothes (fabric. gown and gloves etc.). Dialysis waste (waste water and equipment), quarantine waste, air filters including bacteria and viruses, infected laboratory animal carcasses, body parts, blood and all objects that come into contact with them.
- **Pathological waste** - Anatomical waste tissues, organs and body parts and body fluids generated during surgery, autopsy, and medical interventions: - body parts, organic parts, placenta, cut limbs and so on originating from operating rooms, mortuary, autopsy, Guinea pig carcasses used in biological experiments
- **Stab Waste Hazardous Waste (Cut and drill wastes)** – Wastes that may cause abrasions and puncture wounds such as Injector needle, Scalpel, Lam-lamellae, Glass Pasteur pipette , Broken glass.etc.
- **Hazardous Chemicals** – Cytotoxic and cytostatic drugs, Amalgam waste, Genotoxic and cytotoxic waste, Pharmaceutical waste, Waste containing heavy metals, pressure vessels
- **Radioactive Waste** - Radioactive waste shall be disposed of in accordance to national legislation and international regulations.

Surface and ground water quality impacts

Surface and ground water quality may be impacted negatively by project activities both during construction and operation phase. These may occur through spillages from refuelling of construction vehicles, soil erosion and siltation, storm water contamination and sewer leakages, chemical spills, disposal of radioactive waste substances into the environment.

Mitigation measures

- Install oil and grease interceptors at car wash areas and petrol station and service bays.
- Oil spill containment and cleanup equipment should be kept at the contractor's main yard and at major construction locations, with a small kit in every project vehicle
- Construction vehicles and machines must be maintained properly (including preventive maintenance) to ensure that oil spillages are kept at a minimum.

- All drain pipes passing under building, driveway or parking should be of heavy duty PVC pipe tube encased in 150mm concrete surround
- Provide bins for construction workers at appropriate positions for disposal of litter. These bins can be colour coded to ensure minimal waste of recyclable resources.
- Stabilize storm water discharge points through robust designs to avoid soil erosion.
- Proper siting of waste disposal or fuel storage areas away from storm water impacts.
- Monitoring and testing of quality of water from boreholes and nearby water sources.
- Routine monitoring of sewer pipe networks and manhole covers for leakages and overflows for immediate repair
- Avoid discharging disinfectants and cleaning agents into waste water treatment plant as it can alter the biological environment
- Ensure proper treatment and monitoring of effluents before discharge to the environment or sewer system

Biodiversity Impact

The proposed project site has been in use as a military camp with mainly residential, storage and office buildings. The site does not have any indigenous trees or wild animals. There exists a few planted trees, bushes and grass covered sections which could be home to a few insects and rodents.

Mitigation measures

- Replant cleared areas with appropriate vegetation such grass to arrest soil erosion.
- Landscape exposed and vulnerable sites between buildings
- Adequate storm-water management must be incorporated into the design of the proposed development to prevent erosion and siltation that may impact biodiversity negatively.

Air Pollution Impacts

- Impose speed limits (10 km/h in all areas within the site boundaries).
- Regular water sprays on access roads, stockpiles and cleared to minimize dust pollution.
- No open air burning of refuse wastes on the premises or surroundings. Refuse wastes should be removed by an official contractor and dumped at an approved site in compliance with local laws regulations.
- Proper rehabilitation of disturbed areas is required in order to minimize bare patches.

- Vehicles to be used during the construction phase well serviced and maintained to prevent or minimize release of excessive fumes.
- Covering of trucks and vehicles transporting materials to prevent dust or particles from flying off the vehicles.
- For the workers who must be at the dusty locations, they should be provided with personal protective equipment (PPEs).

Noise Impacts

Mitigation measures

- Fit silencers on equipment and machinery that are expected to generate a lot of noise.
- Provide workers expected to work in noisy areas with ear muffs and enforce their use by worker through stringent supervision.
- There should be no unnecessary honking of the involved machinery and vehicles.
- Schedule road traffic movements to normal working hours (08H00 –17H00).
- All equipment and vehicles on the site should be properly serviced and maintained to reduce noise.
- Work stations expected to generate a lot of noise should be shielded for instance corrugated iron sheet.

Traffic Impact impacts

Construction activities will result in a slight increase in traffic by heavy vehicles in the area that can result in disruptions to traffic flow, even though only for a short period. This can lead to a moderate negative impact during the construction phase with or without mitigation.

Mitigation measures

- Adequate and appropriate road signs should be erected to warn road users of the construction activities.
- Sensitize drivers on safe driving and working practices
- Avoid transporting materials during periods of peak traffic activity
- Traffic should be controlled especially during material delivery mostly when large trucks are turning into the site
- Vehicles should be controlled at point of entry and departure from the hospital to avoid traffic jams at the adjacent roads
- Deploy enough personnel and install equipment for use in vehicle security screening and control
- Construct a service lane to accommodate vehicles awaiting for security check to the site
- Follow the recommendations contained in the Traffic Impact Assessment Report

Health, Safety and Security impacts

Most health and safety impacts during construction phase will be onsite and will be short term in nature. However, a few others may affect the larger community. These may include accidents from vehicles delivering material to site and other construction site activities with potential of causing injuries to residents.

Mitigation measures

- The Contractor shall conform to all the stipulations of the Occupational Health and Safety Act, 2007. The Act requires the designation of a Health and Safety representative when more than 20 employees are deployed.
- The contractor shall provide ample warning signs, guard rails, warning tape, etc., around open excavations, stacks of material, debris, etc. and shall be held liable for all claims as a result of neglect of such precautions and provisions.
- Proper access control should be enforced to ensure that no unauthorised persons enter the site.
- Construction vehicles should be under the control of competent personnel. Ensure that persons handling equipment and materials are suitably trained, supervised and adequately instructed. Establish and enforce a strict code of conduct for all project drivers including outside suppliers delivering materials
- Establish and implement an HIV/AIDS prevention programme specifically related to the project's construction phase. The programme should include those at high risk of engaging in unsafe sex conduct such as truck drivers and bar workers
- Ensure that the contact details of the fire brigade and ambulance services are available on site
- Use of detection and alarm systems including communication and public address systems to detect a fire and alert the building staff, emergency response teams, occupants and other fire response units.
- Use of automatic and manual fire suppression and control equipment, such as automatic sprinkler systems, manual portable extinguishers, and fire hose reels.
- Formulate an Emergency Response Plan for the hospital to assist staff and emergency response teams during fire emergency.
- Regular servicing and testing of fire-fighting equipment and facilities to ensure they function properly at all times and as required by law.

Increased Water Demand

There will be an increased water demand due to increased construction activities. Water will be used for drinking, in the washrooms for workers and staff, dust suppression and in the mixing and making of concrete.

Mitigation Measures

- The proponent shall ensure that water is used efficiently at the site by sensitizing construction staff to avoid irresponsible water use.
- Install water conserving automatic taps and toilets.
- Fix any water leaks from damaged pipes and faulty taps
- Apply for water abstraction permit as required under the Water Act, 2016
- Install water conserving automatic taps and toilets.
- Ensure that any water leaks through damaged pipes and faulty taps shall be fixed promptly by qualified staff.
- Consider rain water harvesting to have alternative water supply

Increased demand on Energy

There will be increased energy demand during the construction phase of the project that will be met by via electricity distribution network of the KPLC. Stand by power generators will be used in case of electric outages.

Mitigation measures

- Employ the use of energy saving bulbs at the premises;
- Install security lights with sensors to save on energy during the night
- Switch off all electrical equipment when not in use to save energy
- Install alternative energy sources such as solar power to assist in lighting and warming of bath water
- Monitor and keep records of energy use. Undertake yearly energy audits on all types of energy usage in the facility for better decision making on energy conservation

CHAPTER 1

1. INTRODUCTION

1.1 Prelude to the Ministry of Defence

The Ministry of Defence was created by the Executive Order No. 2 of May 2013 (Revised February 2020). The work of the Ministry of Defence is informed by the Constitution of the Republic of Kenya. The Ministry is obliged to facilitate and support the Kenya Defence Forces (KDF) in the discharge of their mandate under Article 241 (3) (a), (b) & (c) of the Constitution. At independence, the MoD was referred to as the Ministry of Internal Security and Defence which encompassed the military, police and prison. During this period, there were only 21 civilians spread over the Kenya Army, the Kenya Air Force, the Kenya Navy, the Kenya Police and Prisons.

The Ministry has changed names since independence through Executive Orders of the President that spells out names of Ministry's. It has been referred to as:

- Internal Security and Defence,
- The Department of Defence (DoD),
- The Ministry of Provincial Administration and National Security
- The Ministry of State for Defence
- The Ministry of Defence

The Ministry is headed by the Cabinet Secretary who is responsible to the **President and Commander – in – Chief** and Parliament on matters of policy. The **Cabinet Secretary** is appointed by the President and chairs the Defence Council which is responsible for the overall control and direction of the Kenya Defence Forces.

The promulgation of the new Constitution 2010 created the Kenya Defence Forces (KDF) which comprises of the Kenya Army, Kenya Air Force and Kenya Navy. The KDF is governed by the Kenya Defence Forces Act, 2012 and the President of Kenya is the Commander-in-Chief of all the armed forces (Source: <https://mod.go.ke/about-us/>).

1.2 Project Background

The Government of Kenya is committed to improving welfare of the country's security sector for better services and this is being achieved through healthcare reforms for the disciplined forces that are in tandem with the Government's agenda on Universal Health Coverage (UHC) which has also witnessed improvements in the services offered to the civilian population.

The increase in Kenya's security forces operations has led to increased requirements for medical and surgical care. Similarly, the increase in the prevalence of non-communicable diseases like cancer and heart disease has led to a dire need for diagnostic and treatment equipment such as oncology and cardiology services, which are currently not available within Kenya Defence Forces (KDF) medical facilities. Outsourcing of these services from public

facilities is slow and inconvenient due to the high demand for the same services by the general population, whereas outsourcing from private institutions tends to be prohibitively expensive.

In this light, The Ministry of Defence has invested heavily in health facilities strategically across the country in line with the UHC pillar of the Big 4 Agenda, an economic blueprint developed by the government to foster economic development and provide a solution to the various socio-economic problems facing Kenyans.

The Ministry of Defence intends to construct the Kenya Forces Referral and Research Hospital (FRRH) within Kabete Barracks on Land L.R. No. 209/12348, Westlands Nairobi City County, which is a key Government of Kenya priority project. This facility will provide Level VI specialised services and is expected to complement the Defence Forces Memorial Hospital (DFMH) which is the sole referral hospital for security forces in Kenya.

The proposed hospital is part of a myriad of similar projects that have been actualised through the recent healthcare reforms within the disciplined forces as part of the UHC, others being construction of:

- The recently commissioned ultra-modern KDF Isiolo Regional Hospital within Isiolo Barracks (Level VI)
- Kahawa Garrison Level II Hospital
- KDF Eldoret Regional Hospital (Level VI)
- Ruiru Prisons Hospital -Level VI (Wanini Kereri Magereza Hospital)
- National Police Service Referral Hospital in Mbagathi (Level VI); and
- Upgrade of the Forces Memorial Hospital to a Level V facility

The First Schedule of the Health Act, 2017 of the Laws of Kenya provides that Level VI Hospitals shall be National Referral Hospitals whose functions are to provide highly specialized services in the areas of general specialization, discipline specialization and specialized healthcare for area/regional specialization. They also serve as Research Centres and are required to provide teaching and research services for issues of National importance.

The proposed FRRH will enable all uniformed forces including KDF and other Government Security Agencies e.g NPS & NIS etc to enjoy adequate and timely healthcare services to its personnel during operations and in peace time. It will also cater for the referral medical needs of members of other security agencies and Senior Government Officers and VIPs. It shall also serve KDF retirees and veterans while also supporting the National Government, through Ministry of Health (MOH) in the realization of the ‘Big 4 Agenda’.

Due to numerous environmental challenges, resulting from unsustainable implementation of development programs and projects, the Kenyan government harmonized environmental laws under the Environmental Management and Coordination Act (EMCA), 1999 and its 2015 amendment, for the purposes of coordinating environmental management. EMCA 1999 and the 2015 amendment makes Environmental Impact Assessment (ESIA) mandatory for all the

projects specified in the Second Schedule of the Act. It is in pursuit of this piece of legislation that the project proponent commissioned this ESIA process.

The project has a capacity of **700* Beds** and it will be installed within the current Kabete Barracks. The Barracks located along Waiyaki Way, seats on a KMOD-owned property Land L.R. No. 209/12348, Westlands Nairobi City County approximately 9 km to the West of Nairobi City's CBD with a total area of approximately 30 Acres (12.409Ha). The proposed delivery model is by Design, Construction and Equipping of the FRRH. The main objective of the project is to enable all uniformed personnel; Kenya Defense Forces (KDF), National Intelligence Service (NIS), Kenya Police, Kenya Prison, Administration Police (AP), Kenya Forest Service (KFS), Kenya Wildlife Services (KWS), National Youth Services (NYS), VIPs and their families to access efficient, quality, accessible and affordable healthcare.

Visual plan of the Project is given in **Figure 1** and location map of the Project is given in **Figure 2**



Figure 1: Visual Plan of the Project

1.3 Justification of the proposed project

The increase in Kenya's security forces operations has led to increased requirements for medical and surgical care. Similarly, the increase in the prevalence of non-communicable diseases like cancer and heart disease has led to a dire need for diagnostic and treatment equipment such as oncology and cardiology services, which are currently not available within

Kenya Defence Forces (KDF) medical facilities. Outsourcing of these services from public facilities is slow and inconvenient due to the high demand for the same services by the general population, whereas outsourcing from private institutions tends to be prohibitively expensive.

Currently, the Defence Forces Memorial Hospital (DFMH) is the sole referral hospital for security forces in Kenya thus the proposed Kenya Forces Referral and Research Hospital (FRRH) is expected to complement the DFMH.

The proposed Kenya Forces Referral and Research Hospital (FRRH) will provide Level VI specialised and referral services to all uniformed forces including KDF retirees, veterans and VIPs, Senior Government Officers.

The project is in line with the requirements, targets, and goals of different development goals, legal, and policy frameworks (Vision 2030's Social and economic pillars, 'Big 4 Agenda', and the Constitution of Kenya, 2010) on Government's agenda on Universal Health Coverage.

In terms of environmental degradation, the project is likely to lead to some negative impacts, which shall be taken care of through adherence to the EMMP during implementation and operation of the project.

1.4 Project Objectives

The project objectives include, to:

1. Construct the Kenya Forces Referral and Research Hospital (FRRH), a Level VI hospital within Kabete Barracks, Nairobi County;
2. Enable serving KDF Officers and their families to access efficient, quality, accessible and affordable healthcare;
3. Provide highly specialized services in the areas of general specialization, discipline specialization and specialized healthcare;
4. Complement the Defence Forces Memorial Hospital (DFMH) which is the sole referral hospital for security forces in Kenya;
5. To serve as a Research Centre as well as providing teaching and research services for issues of National importance.

1.5 ESIA Objectives

The main objective of carrying out this ESIA was to ensure compliance with the provisions of Environmental Management and Co-ordination Act, Cap 387 namely The Environmental (Impact and Audit) Regulations 2003 and subsequent revisions. The provisions states that an ESIA study shall be undertaken for major development activities which are likely to have adverse environmental impacts.

The process is guided by a number of objectives:

- To identify potential environmental impacts of proposed project,

- To assess the significance of these impacts,
- To assess the relative importance of the impacts of alternative plans, designs and sites,
- To propose mitigation measures for the significant negative impacts of the project on the environment,
- To generate desktop baseline data for monitoring and evaluation of how well the mitigation measures are being implemented during the project cycle;
- To present results of the ESIA in an acceptable way to the financier.

1.6 Terms of Reference (ToRs) For the ESIA

The Terms of Reference (ToRs) for this report are in accordance with NEMAs' Environmental (Impact Assessment and Audit) regulations, 2003 under the Environmental Management and Co-ordination Act (EMCA Cap 387).

The general Terms of Reference (ToRs) for this report covers the following:

- Description of the proposed project components and activities in each phase including pre-construction, construction, operation and decommission phases. The project description should include location, project design, the technology, procedures and processes, materials to be used, project cost, products, by-products, and waste generated;
- Description of policy, legal, and institutional framework that are relevant to the environmental management and the proposed project;
- Gathering baseline information/existing environmental data and any other relevant information related to the project area including physical, biological and socio - economic conditions;
- Provide a description of the proposed activities throughout the entire implementation process of the project with a special focus on potential impacts to the surrounding environment and facilities;
- Develop an Environmental and Social Management and Monitoring Plan and cost estimates for the proposed project;
- Produce an ESIA report that contains among other issues potential negative and positive impacts and recommendation of appropriate mitigation measures to minimize or prevent adverse impacts as per the ESIA/EA regulations of 2003 and subsequent revisions.

1.7 Methodology of the ESIA study

In undertaking the ESIA, the consultant employed a participatory approach that entailed a range of methods:

1.7.1 Desktop Review

This involved desk studies and review of all relevant available documents on the project activities and components from the client. The team also reviewed all the available and relevant national and international legal environmental documents, standards and guidelines. In addition, national and county level (planning) documents (such as Vision 2030, the Second Medium Term Plan, County Integrated Development Plan) among others relevant to the project area were reviewed.

1.7.2 Field Study

A major element of the study is primary research - both qualitative and quantitative among relevant stakeholders. The environmental assessment team conducted reconnaissance and field visits to the proposed project site in Kabete Barracks, to obtain further data and consult the stakeholders. This established the nature of the surroundings which included existing infrastructure, economic and social set up of the local communities whose normal daily activities will be and/or likely to be affected by the implementation of the proposed project.

Similarly, observations entailed documentation on the physical characteristics of the area including the biological environment.

1.7.3 Data Synthesis

The data collected was used to prepare a comprehensive Environmental Management and Monitoring Plan (EMMP) encompassing the potential impacts, mitigation measures and monitoring indicators which form part of this report.

1.7.4 Reporting

The main output is an ESIA study report comprising of executive summary, assessment methodology, project description, study area, legal and institutional framework, project alternatives, anticipated impacts, an Environmental Management and Monitoring Plan (EMMP), and Decommissioning Plan.

1.8 Project Budget

The estimated proposed project cost is Kenya Shillings Nineteen Billion, Three Hundred and Forty-Seven Million, Seventy-Two Thousand, Three Hundred and Nine Shillings, Eighty-Two Cents (Kshs. **19,347,072,309.82**) Billion.

1.9 ESIA Team Members

Some of the ESIA team members are covered in table 1 below.

Table 1.1: Team Members

	Name	NEMA Reg No.	Role
1.	Shadrack K. Mbuta	6315	EIA Lead expert/ Team Leader
2.	Kibuchi Samuel Waweru	-	Sociologist
3.	Wallace Isaboke	2622	ESIA/EA Lead expert
4.	Hellen Mwende Mukuru	6534	EIA/EA Lead Expert , Safety and Health expert
5.	James Kitonga	7105	Lead EIA Expert
6.	Julie Wanja	4059	Lead EIA Expert
7.	Oduk Vincent Onyango	8992	Environmental/Meteorologist Scientist

CHAPTER 2

2. PROJECT DESCRIPTION

2.1 Introduction

The growing demand for health care services coupled with the rising nature of non-communicable diseases has necessitated the push for the Kenyan Government to implement an effective health care system. Currently, with only one referral hospital, the Defence Forces Referral Hospital, Mbagathi, the need for this ultra-modern health facility to be constructed at the current site for Kabete Barracks arose. The proposed Kenya Forces Referral and Research Hospital (FRRH) which will provide Level VI specialised medical care and referral services to all uniformed personnel including the KDF and other Government Security Agencies (NPS, APs, Kenya Prisons, NIS), NYS, KWS, Senior Government Officers, VIPs, KDF retirees, veterans etc..

2.2 Existing Site Facilities

2.2.1 Site clearance

The proposed site for the construction of the hospital facility has been under use as a military camp and it mainly consisted of accommodation facilities, armory, administration offices, shop, soccer pitch, Covid 19 center and open grass areas. As at the moment, most of these facilities have been demolished and the soldiers moved to another camp. However, a few structures still remain that include 2 blocks of accommodation houses that shall be demolished to give room for building other structures. The roofing and the walls of these houses are made of timber, some concrete blocks and iron sheets therefore no asbestos (See plate 4). The existing VIP lounge shall also be demolished once the proposed alternative is completed.



Plate 1: Part of the remaining Building to be demolished

It should also be noted that most of the existing vegetation and trees at the site have also been cleared and wood taken out of the site.

2.2.2 Construction Progress

The contractor has set up a camp to the Western part of the site to accommodate a few soldiers providing security at the site. There is also a small contractor camp and KDF site offices to the Southern boundary of the site. These buildings are temporary and will be demolished when construction work is completed. The roofing and walls are all made of metal bars and iron sheets while the floors are cemented. The contractor's and project consultant's offices comprise of two blocks built of masonry wall and iron sheets that shall also be demolished upon project completion.

In regard to the proposed hospital buildings, about 4-5% of work is on-going and majorly its excavations and setting up of facilities like steel processing plants, batching plants. Only at the site of building no. 3 (Accident and Emergency Block) has been excavated and form work construction is in progress in the foundation.



Plate 2: Construction status at the site – showing excavations

2.2.3 Buildings to be retained

The only block of buildings to be retained is the Covid 19 Disease Management Centre located to the Eastern part of the site. This is a new building that has been fully equipped for the treatment and management of Covid 19 disease.



Plate 3: The Covid 19 disease Management Centre

2.3 The Proposed Project

The proposed hospital development will be on a 30 Acre land belonging to the Ministry of defence and currently the Kabete Barracks Being Land L.R. No. 209/12348, Westlands Nairobi City County. The proposed Kenya Forces Referral and Research Hospital-Kabete shall be a 700bed capacity facility with comprised of the main hospital and Associated Facilities (Oxygen generating plant, Waste water treatment plant, Medical waste incinerator and Mortuary) and Camp Administrative Unit (CAU). Blocks 1-4 will comprise the main hospital with Block 5 hosting the medical school complex. The rest of the buildings shall form the CAU (Camp Administration Unit) to provide logistical support and services to the hospital, officers and service members such as Messes and Accommodation.

1. THE MAIN HOSPITAL

BLOCK NO. 1#: OUTPATIENT CLINIC

This is a 6 Floor Block comprising of ground Floor to 6th Floor. It will accommodate all outpatient services comprising the Main Entrance Unit, Public and staff amenities, Outpatient Pharmacy, Medical Imaging Unit, Lab and pathology endoscopy unit, Renal dialysis unit, Cardiac Investigation unit, day surgery/procedure unit, ENT Outpatient Clinic, Ophthalmology Oral health unit and Administration unit.

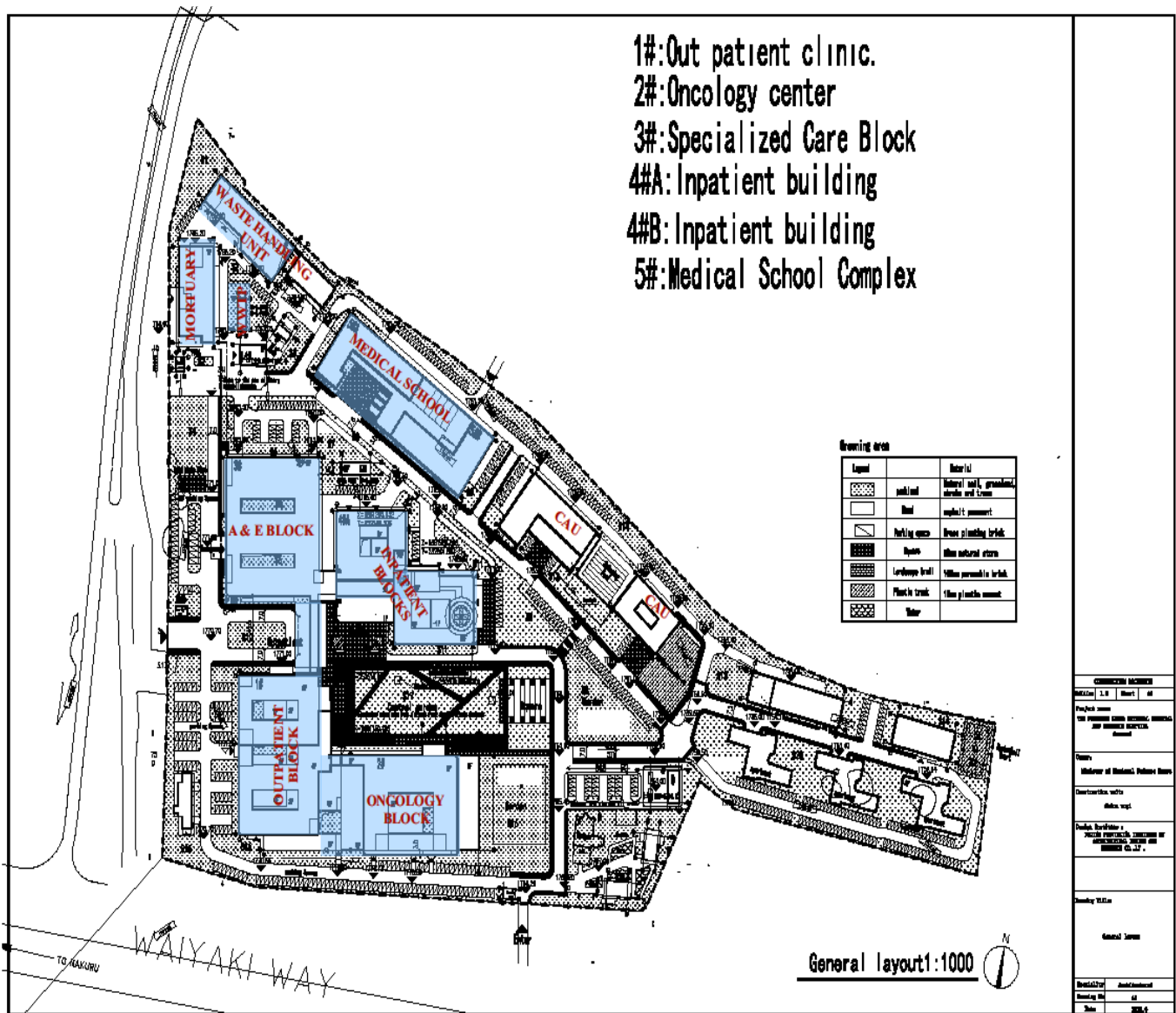


Figure 2: The Kenya Forces Referral and Research Hospital (KFRRH-Kabete) Site Plan.

Environmental Considerations

Acoustics

1. This block may have a high level of ambient noise from visitors, waiting areas and ambulance traffic.
2. Acoustic measures to reduce sound reverberation shall include:
 - a. Installation of sound absorbing surface materials to walls, floors and ceilings.
 - b. Provision of acoustic fabrics to waiting chairs.
 - c. Acoustic screen panels to waiting areas.
 - d. Sound absorbing fabric drapes to windows.
 - e. Provision of an augmented hearing loop service for patients and visitors with hearing impairment should be considered for enclosed Reception Desks.

Natural Light/Lighting

1. Natural light is recommended to promote a pleasant environment for patients, visitors and staff entering the facility. Windows shall be installed in waiting areas. Entry and waiting areas shall be welcoming and well-illuminated with natural and artificial lighting.

2. General lighting at the Reception Desk and in staff work areas shall be even, sufficient for illumination of the work area, avoid glare to computer screens and non-reflective.

Accessibility

1. Design shall provide ease of access for wheelchair bound patients and visitors at pathways and external ramps, Airlocks, Reception Desk and in waiting areas.

Doors

1. Entry doors shall be automatic and be sized to provide access for wheelchairs and people with mobility aides entering and exiting concurrently.

Safety & Security

1. A safety risk assessment shall be undertaken in early planning. Security issues that need to be addressed in the Main Entrance include:

- a. Unobstructed viewpoints for staff from counters to Waiting areas and the Main Entrance.
- b. Duress alarms and emergency exit points to all counters.
- c. Security to the Reception Desk to prevent unauthorized access behind counter areas.
- d. Controlled after-hours access to prevent unauthorized entry and exit; external doors locked (preferably electronically) and monitored.
- e. CCTV to Waiting areas and Cashier stations.
- f. Provision of emergency and safety lighting to drop-off and pick-up transport zones for after-hours use.
- g. A duress alarm system shall be designed into the Reception Desk, Enquiries stations and Cashier positions.
- h. Care must be taken to ensure infection control measures applicable shall involve prevention of cross infection between staff, patients and visitors.

BLOCK NO. 2#: ONCOLOGY CENTER

This will be a 4 Floor Block to offer all oncology services including Oncology & Radiation Unit as well as Community Health Unit. A ground floor site or basement shall be used to cater for the weight of equipment and associated shielding and access for equipment and radioactive isotopes. Gamma camera rooms shall have control areas, radiation screening and other detailed specifications as recommended by the manufacturer and Radiation Consultants.

Environmental Considerations

Acoustics - Acoustic treatment shall be installed and applied.

Natural Light

1. Natural light shall be provided in all patient areas, staff room and staff offices. Lighting level in reporting rooms shall be adjustable.
2. External windows provided in scanning and uptake rooms shall be assessed by a Radiation Consultant for shielding requirements.

Safety and Security

The Nuclear Medicine Unit shall include a safety shower with an eyewash station for use in the event of radioactive spills.

Management of Radioactive substances spills is a key safety consideration within the PET suite and shall include the following measures:

All surfaces including floors, bench tops, walls and junctions shall be impermeable and easy to clean.

An emergency shower and eye wash for patients and staff shall be readily accessible and located in close proximity to all areas of potential exposure.
A decontamination kit shall be stored in the Hot Lab for quick access to contain and clean up radioactive spills.

Car parking

An identified parking area for vehicles delivering isotopes is required to enable rapid access to the Hot Lab.
Patients and visitors shall use the public parking facilities with access to drop-off areas and disabled parking.

Construction Standards

Special attention shall be given to the following in the design of the PET suite:
Structural support for equipment; floors must be able to support the weight of equipment and shielding which is significant. Ensure proper ventilation for heat generating equipment and extraction for Hot Labs. A suspended ceiling may be considered for ease of installation, service, and remodeling.

Radiation Protection and Monitoring - Personnel

Staff shall be monitored with an approved dosimeter badge attached to clothing. Electronic personal dosimeters may be worn to allow dosage received during the day from specific activities to be assessed and minimized.
These are particularly useful during the training of new staff. In addition to fixed radiation shielding in walls, mobile lead screens may be provided for use in Uptake Rooms for administering radiopharmaceuticals and in the PET Scanning rooms for positioning the patient.

Radioactive Waste Management

Radioactive waste is waste that contains radioactive substances and may be solid, liquid or gaseous.
The radioactivity diminishes with time, so waste products may be held until considered safe for routine disposal. Radioactive waste is no longer deemed to be radioactive once lead shielded and allowed to decay to a safe level as set by the regulatory authority.
Due to the rapid decay of radioisotopes used for PET studies, very little solid waste shall need to be stored except for syringes, needles, cannula etc.
Specially designed lead-lined sharps bins shall be readily accessible for use by the clinicians and technicians in the PET suite as required by relevant authorities.
Radioactive waste shall be held in the Hot Store until decayed and removed to general waste holding areas.
The requirement for delay holding tanks for effluent from patient toilets in the uptake areas shall be assessed by the Radiation Safety Officer.

Safety and Security

Security of radioactive material is important and subject to radiation safety regulations. Security measures for the PET suite shall include the following:

- a. Access control to the Unit
- b. Controlled staff access after hours
- c. CCTV camera surveillance
- d. Reception area and staff station shall have duress alarm buttons in obscure but easily

accessible locations; there shall be a combination of fixed and personal duress alarms. The Community Health Unit shall require good external security which shall include CCTV surveillance. A high standard of safety and security shall be achieved by careful configuration of spaces and zones

Radiation Shielding and Radiation Safety

All rooms that are used for undertaking imaging procedures shall have radiation shielding including PET/CT scanning, Hot Labs, Hot Stores and any rooms holding patients injected with radionuclides. The PET suite shall be registered or accredited by the relevant radiation or nuclear safety authority.

Infection Control

1. Paths of travel for inpatients shall be separated from outpatients as far as possible to prevent cross infection between patients, visitors and staff.

Hand Basins

Hand hygiene is an essential element of infection control and hand basins shall be required.

BLOCK NO. 3#: ACCIDENT AND EMERGENCY (A&E)/ SPECIALIZED CARE BLOCK

A 5 Floor Block accommodating the Emergency unit, Mental Health Inpatient unit, Biomedical Engineering & Maternity Unit.

The function of the Accident & Emergency Unit shall to receive, stabilize and manage patients (adults and children) who present with a large variety of urgent and non-urgent conditions whether self or otherwise referred. The Accident & Emergency Unit also provides for the reception and management of disaster patients as part of the Unit's role within each region.

Safety and Security of some of the units in this block

The entry to the Child and Adolescent Mental Health Unit shall have a direct view of the Reception/ Staff Station. Security features shall be installed at all entrances and exits.

These shall include electronic locking, intercoms, and video surveillance (CCTV).

A separate secured entry shall be provided for patients arriving with a police escort (applicable to Adolescent Units only).

The design shall assist staff to carry out their duties safely and to supervise patients by allowing or restricting access to areas in a manner which is consistent with patient needs/skills.

Staff shall be able to view patient movements and activities as naturally as possible, whenever necessary and may be assisted by CCTV where appropriate.

All Meeting, Counselling, Group Therapy, Family Therapy and Review Board Meeting rooms shall have two means of egress and a duress alarm.

Controlled access shall discourage unauthorized entry and isolate the area from general hospital traffic.

Signposting shall direct access to the Sterile Supply Unit (SSU) Office/Reception for general purposes, and visitors to the Unit.

Door signs shall be installed on restricted access doors.

For the birthing unit, in general shall be isolated from disturbing sounds of traffic and sirens of ambulances, either through its strategic location or through applying sound absorption and insulation techniques. Birthing sounds must not be audible outside confines of space.

Access

Discreet access for goods and services (linen, food, supplies etc.) that does not traverse patient occupied areas. Access to and between zones shall be restricted to authorized persons only (including access by patients to external areas).

Parking

The following shall be required:

- Disabled access drop-off for patients and their visitors.
- Ambulance.
- Police.
- General visitor parking including disabled access parking bays.

Radiation Shielding and Radiation Safety in the birthing unit

1. Operating Rooms that are used for undertaking imaging procedures shall have radiation shielding installed to local code.
2. All radiation protection requirements shall be incorporated into the final specifications and building plans and radiation protection re-evaluated if the intended use of a room changes, equipment is upgraded or surrounding room occupancy is altered.
3. Floor and ceiling shielding shall be provided when rooms immediately above and below are occupied.

Infection Control

1. Infection control issues are paramount in the Operating Unit and require careful attention to planning models and separation of clean and dirty workflows.
2. Isolation rooms (Positive and Negative Pressure) in Holding and Recovery areas shall be provided as indicated in the Schedule of Accommodation.

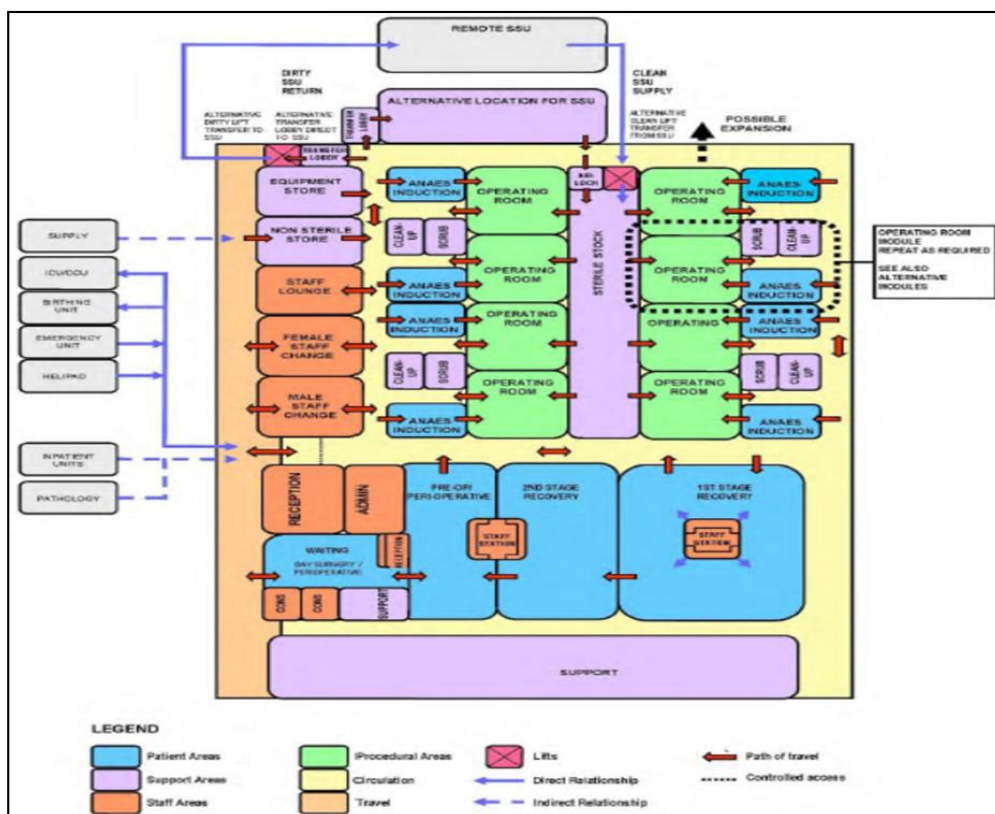


Figure 3: Operating Unit Dual Corridor Model

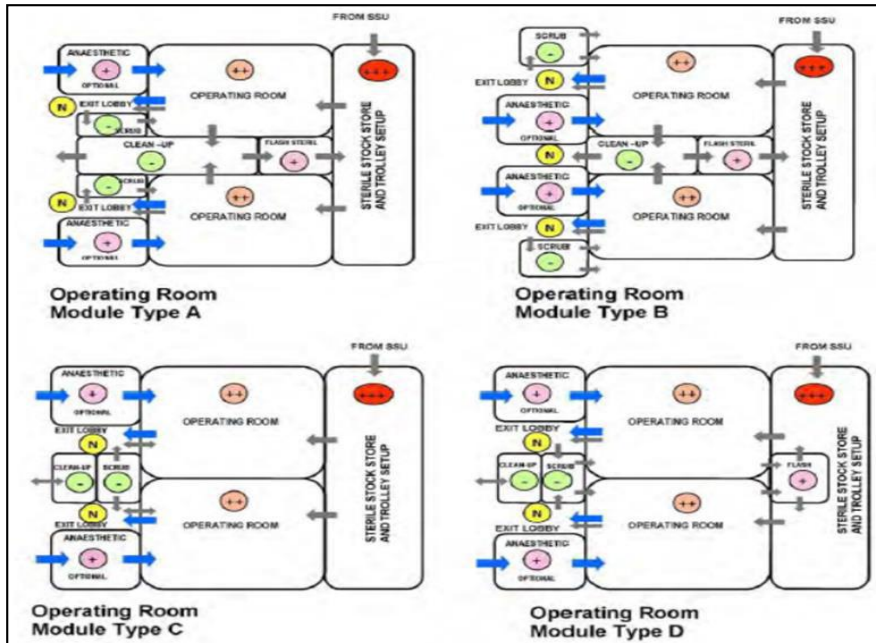


Figure 4: Air Pressurization Diagrams: Operating Unit

BLOCK NO. 4#A: INPATIENT BUILDING

An 11 Floor Block comprising the following the Catering Unit, Equipment, Burn Unit, Maternity Unit (GCN, SCN, NICU) and Intensive Care Unit –general and Inpatient Unit.

In this block, there shall be a maintenance workshop & Storage at each floor level (may be shared by adjacent units) to allow for maintenance and servicing of equipment at the point of use. Sufficient space shall be provided for a workbench and power outlet in each of these areas.

Environmental Considerations

1. Catering Units have high levels of ambient noise due to mechanical equipment, extraction units, and materials with high reverberation scales.
2. Dining areas tend to be noisy and shall require acoustic treatment, particularly to walls adjoining other departments. Provide acoustic treatment to dishwashing areas.

Natural Light/Lighting

1. Natural light shall be maximized to provide a pleasant work environment where possible.
2. Artificial lighting shall be sufficient to enable people to work, use facilities and move from place to place safely and without experiencing eye-strain. Lights shall not be allowed to become obscured, for example by stacked goods.
3. In the supply unit, provide natural light to office and staff areas where possible

Waste Disposal in this block

Provision shall be made for regular wet and dry waste storage, removal and disposal in accordance with Waste Management guidelines and policies. All garbage, and in particular wet waste, shall be stored in sealed bins. Provision shall be made for the storage and cleaning of bins. Provision shall be made for:

- Refrigerated wet waste storage.
- Special equipment to reduce the water content of wet waste.

Security

The Catering Unit shall require controlled access to prevent unauthorized entry and the Unit shall be isolated from general hospital traffic.

Visitors to the Unit shall be directed to the Main Reception of the facility for directions. Door signs shall be installed on restricted access doors.

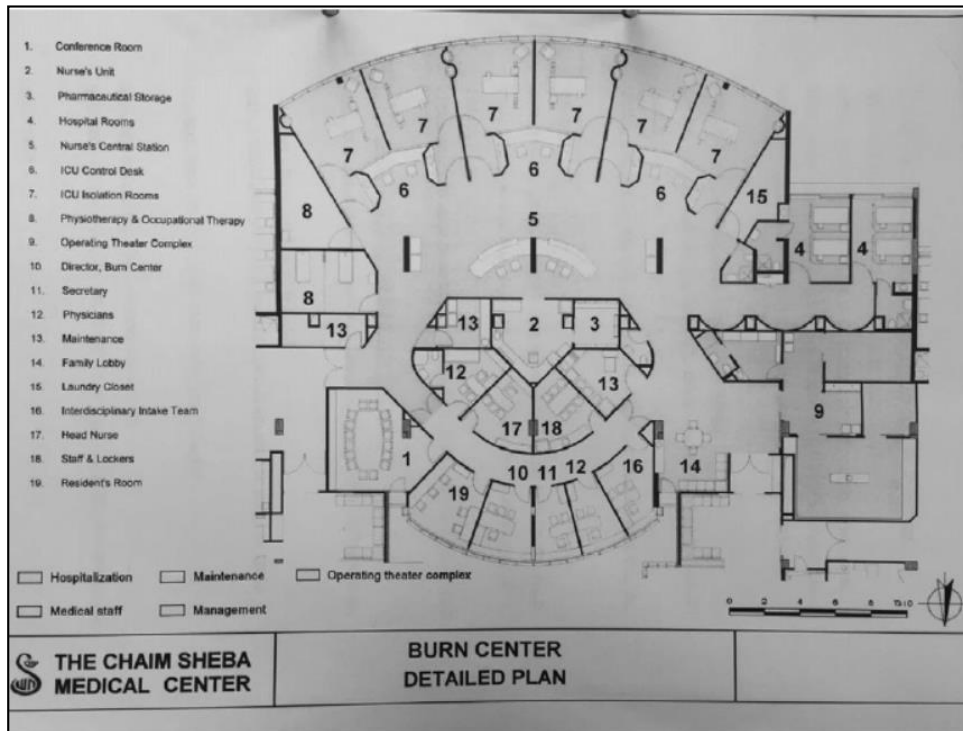


Figure 5: Scheme of proposed burns unit

BLOCK NO. 4#B: INPATIENT BUILDING

This is a thirteen Floor Block with a Roof Floor that will have Helipad for landing of helicopters and powered lift aircrafts. It will comprise of Supply Unit Equipment, Admissions and Discharge unit, medical records room, pharmacy, Coronary care unit (32 beds), ICU and HDU.

In this block; Location of wards shall ensure privacy, particularly at night. Ground-floor locations shall be considered only where the adjacent environment is free of hospital traffic and publicly accessible areas. Outside views and access to sunshine or direct daylight shall be provided.

Safety and Security in these blocks

The arrangement of spaces and zones shall offer a high standard of security through the grouping of like functions, control over access and egress from the Unit and the provision of optimum observation for staff.

MEDICAL SCHOOL COMPLEX

This is a 7 Floor Block. This Block that shall be mandated to offer medical training to KDF personnel. It shall house the school training unit as well as Accommodation.

Location

The school shall be located in a quiet environment preferably a stand-alone complex away from noise and traffic.

It shall be collocated with the hospital complex where students will be undertaking clinical training. The accommodation shall be in within the school complex and in a secure setting.

- 2. CAMP ADMINISTRATIVE UNIT (CAU) – This shall comprise of units** to provide logistical support and services to the hospital, officers and service members such as Messes and Accommodation.

- 3. ASSOCIATED FACILITIES – These shall be composed of: -**

MORTUARY UNIT – This forms part of the associated facilities for the hospital establishment

WASTE HANDLING UNIT – This is a 2 floor Block unit for proper management and disposal of waste.

WASTE WATER TREATMENT PLANT – This facility shall ensure treatment of wastewater and remove pollutants

OXYGEN GENERATING PLANT - Given the nature of the hospital, its size and its specialty; the hospital will have its own Oxygen generating plant to ensure constant Oxygen supply.

MORTUARY UNIT

The Hospital Mortuary shall provide a facility for autopsy, embalming, storage, viewing and/or identification and casketing of bodies.

Location

The mortuary location design shall ensure:

- Separation of the unit from the main hospital building.
- Easy access to mortuary staff and related service providers without presenting either aesthetic, emotional or ethical problems for unrelated hospital staff, patients or visitors.
- Clear and direct access without having to travel unnecessarily through hospital departments.
- Bodies shall not be moved into or out of the mortuary through general public-access areas.
- Provision for contingency access to the mortuary in the event of case-load surges, which may result from disasters.
- Provision of pleasant surroundings in order to promote the dignity of those working in or visiting the mortuary.
- Location at ground level to allow easy and discrete access to deliver and/or remove bodies via an exit lobby.

Safety and Security

1. Door closers with a “hold-open” mechanism shall be installed on the mortuary room doors. “Crash”-type doors shall be avoided as these are not easily cleanable and are subject to damage and abuse.

Air conditioning

1. The mortuary and autopsy area must have a temperature maintained between 20°C and 21°C.
2. Public areas shall be kept at a constant temperature between 23°C and 25°C.
3. Air extracted from the mortuary shall not be used for energy recovery or recirculation

WASTE HANDLING UNIT, LAUNDRY, AND LINEN HANDLING UNIT

This is a 2 floor Block unit with the following: -

- Waste handling Unit (Including Incinerator), Laundry & Linen handling Unit
- Laundry and Linen Handling Unit

The Waste Management Unit shall be a designated area which shall be staffed by a multidisciplinary team whose roles shall include collection, transport, processing, disposal, managing and monitoring of waste materials generated from the Hospital. The waste shall be divided into five broad disposal categories: -

- Infectious and Pathological Waste.
- Sharp Waste.
- Pharmaceutical Waste.
- Radioactive Waste.
- General Waste.

The Waste Management Unit shall have the following features:

- Easily accessible from all functional areas.
- Accessible from within the unit and externally.
- Fitted with security fittings such as door locks, keypad/card access, CCTV and motion sensor.
- Located away from food and clean storage areas.
- Not accessible to the public.

For clinical Waste Storage the Sharps Waste shall be segregated from 'soft' clinical waste and stored in robust colour coded receptacles which clearly identify the presence of sharps prior to being disposed by incineration or the authorized waste management contractor.

Radioactive Waste Storage

Radioactive waste shall be stored in leak proof containers in a specifically identified area for the storage of radioactive waste separate from clinical and general waste storage. The handling, storage and disposal of radioactive materials shall comply with requirements of the Radiation Control Act and other relevant local regulations.

Safety and Security

The Waste Management Unit shall not be accessible by public. Card access, intercom or CCTV cameras shall be provided at the Loading Dock and external access for visitor control to the Unit. Where required, concave directional mirrors along corridors and bends shall be provided to avoid collision of oversized trolleys, motorized transporters and staff.

Emergency stop button shall be installed for large equipment such as waste compactors to prevent entrapment.

Exhaust shall be provided in rooms for storing and recharging of pallet jacks, motorized transporters and other equipment depending on battery type to avoid build-up of noxious gases.

Other Support Facilities:

These shall have the following Functional Areas: -

Security:

Gate & Gate House.

Guard Room.

Recreational Facilities:

Outdoor Games Area.

Gym.

Swimming Pool.

Prayer Centres & Family Shop:

Mosque.

AC Chapel.

RC Chapel.

DEFECO Shopping Complex.

Power House Utility Building/Yard.

CHAPTER 3

3. BASELINE ENVIRONMENTAL INFORMATION

3.1 Administrative Location

The proposed site land **L.R. No. 209/12348** is located in Highridge Ward, Westlands Constituency in Nairobi County. Westlands Constituency is one of the 290 electoral constituencies in Kenya. It is also one of the seventeen (17) constituencies in Nairobi City County. Other County Assembly Wards in Westlands Constituency include Parklands/Highridge, Kangemi, Karura & Mountain View. Parklands/Highridge ward has an area of 8.20 sq. Km with a population of 89,156 people.

Figure 1 below is a map of the constituency while Figure 2 shows the site within the Nairobi County map.

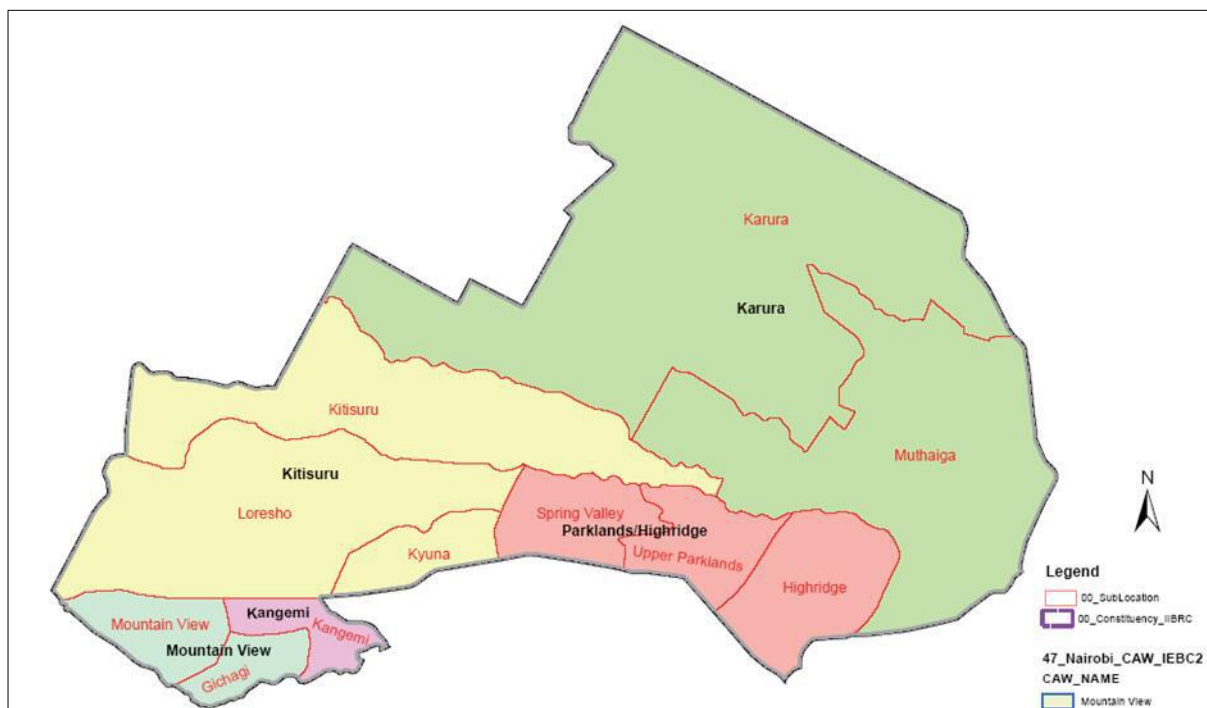


Figure 6: Westlands Constituency, Nairobi County (Source: www.softkenya.com)

The site is bordered by Nairobi school and Kyuna Estate to its immediate West, while Spring Valley Estate occupies its North. To the East, the site borders Muguga Green Estate and the larger extended Westlands zone while to its South, the site borders Muthangari and parts of Lavington Estate. The immediate neighbourhood is characterised by mixed use developments with commercial, residential as well as office use.

Access to the site is through Waiyaki way as well as the Westlands – Red Hill Link Road. The site also enjoys the Nairobi Express Way designed as an access controlled dual carriageway to run along the central reserve of the A8 road starting from Mlolongo all the way to James Gichuru, Waiyaki way and the Westlands – Red Hill Link roads junction.

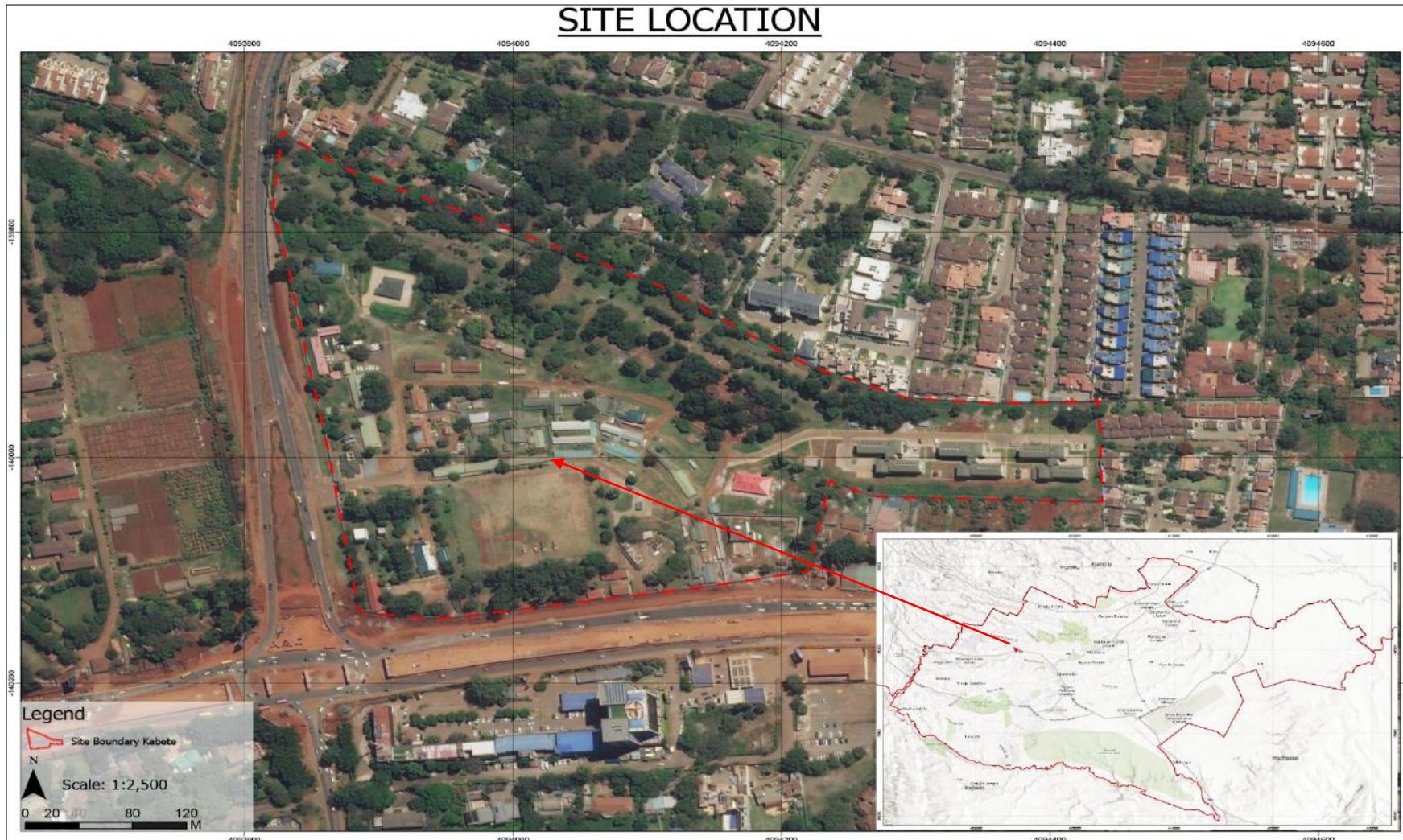


Figure 7: Showing Proposed site on context of Nairobi County Map

3.2 Demography

According to the KNBS 2019 census, the population of Nairobi is 4,397,073 inhabitants who live within 696 km² (269 sq mi). The capital city's population has grown 40 per cent in the last 10 years from 3,138,369 in 2009, the 2019 census data reveals. This now means Nairobi accounts for 9.2 per cent of the country's total population which stands at 47,564,296 people. As per the KNBS 2019 census, Nairobi's population is projected to be over five million by the year 2025.

As per the 2019 National census, Population within Westlands Constituency was 297,898 people whose distribution is as shown in the table below: -

Table 3.1: Population distribution in Westlands Constituency

County Assembly Ward	Population	Area (Sq. Km)
Kitisuru	33,659	21.3
Parklands/ Highridge	89,156	8.2
Karura	24,714	38.2
Kangemi	150,369	1.6

The Constituency is generally densely populated except in Karura Ward and parts of Kitisuru Ward. Kangemi and parts of Mountain View wards have the highest population density and they are characterized by many residents living in informal settlements. Generally, the Constituency has a high population density of 2,441 persons per square kilometre. (<https://www.westlandsconstituency.co.ke/index.php/2013-06-30-18-04-13/about-westlands>)

3.3 Climate and Temperature

According to the *Koepfen-Geiger* classification, the climate of Nairobi a warm temperate, fully humid climate. The County has a semi tropical - fairly cool climate resulting from its high altitude. Mean daily temperature ranges from a low of 10⁰C to a high of 29⁰C. On average, temperature is almost constant at about 20⁰c, throughout the year, with a mean monthly relative humidity between 36 and 55 percent. In Nairobi, the warm season lasts for about 2-3 months, from late December to early March, with an average daily high temperature above 26⁰C. The hottest day of the year is typically in February, with an average high of 30⁰C and low of 16⁰C.

The cool season lasts for about 3 months (from June to August), with an average daily high temperature below 22⁰C with the coldest day of the year (in July) having an average low of 12⁰C and high of 21⁰C.

Nairobi has a bi-modal rainfall pattern characterized by two rainy seasons: a long rainy season between March and May, with a mean rainfall of 899 millimetres (mm) and a short rainy season between October and December, with a mean rainfall of 638 mm. The mean annual rainfall is 786.5 mm (Nairobi County Integrated Development Plan, 2018).

Westlands Constituency enjoys a warm tropical highland climate. The average daily temperatures range from 29°C in the dry season to 24°C during the rest of the year. The mean annual temperature is 17°C and mean daily maximum and minimum are 23°C and 12°C respectively. The average annual rainfall is 875mm, with variation range of 500-1500mm.

3.4 Physical and Topographic Features

3.4.1 Topography

The terrain in the eastern side of the County is gently rolling but divided by steep valleys towards the City boundaries.

Westlands Constituency is among the highest areas of Nairobi County in terms of altitude (1800 -1850masl) but with a rugged topography.

At the proposed site, and around ABC place, the topography ranges from flat on the South to gentle and slightly steep slopes to the North and is at an altitude of approximately 1788m above sea level.



Plate 4: Terrain around the site (showing the hilly areas of Kitisuru at the background)

3.4.2 Flora

Majority of Westlands area has some good vegetation cover and is generally green. There are three forests in Nairobi County namely Ngong Forest to the south, Karura Forest to the north and the Nairobi Arboretum. The three forests have a total coverage of 23.19 Km².

The indigenous Karura forest which is characterized by steep sided valleys is spread over parts of the Westlands Constituency. The areas around the site are dominated by *Grevilea robusta*, *Casuarina equisetifolia*, *Croton megalocarpus* and *Vitex keniensis* types of trees. The ecological significance of trees in majority of this area is for aesthetic purposes and as well of good ecological importance like carbon sequestration. At the proposed site; majority of the trees and vegetation has been cleared and will be cleared to pave way for the proposed hospital. The client and the contractor are urged to engage the services of a Landscape Architect to advice on the best kind to of trees to be planted for landscaping.

3.4.3 Fauna

The areas surrounding the proposed site are exhibit a built environment with minimal fauna. However, some birds such as common bulbul, crows and marabou stocks are common Westlands round about. The undisturbed and vegetated areas around the site are rich in red soil and terrestrial and exhibit presence of macro-fauna. It is likely that diverse insect and other invertebrate species inhabit in these areas. The presence of small wild animals as well as reptiles is also highly likely.

3.4.4 Water resources

The main rivers in Nairobi County are Nairobi River, Ngong River and Kabuthi River. These rivers are highly polluted as open sewers and industrial waste is directed towards them. Nairobi dam, which is along the Ngong River, and Jamhuri dam are the main water reservoirs in the County.

The Nairobi and Mathari rivers transverse numerous neighbourhoods of Westlands Constituency. Nairobi River has Thigirie, Getathuru, RuiRuaka and Karura tributaries while Mathare River has no major tributaries. Majority of the rivers in Nairobi are generally polluted and un-clean



Plate 5: A tributary of the larger Mathari River about 1km from the site.

3.4.5 Geology & Soils

Nairobi City is mainly underlain by pyroclastic volcanic rocks that were deposited during the formation of the East African Rift Valley. Some of the volcanic rocks were deposited in aqueous conditions over a long period of time and are therefore intercalated with lacustrine sediments. River valleys and other depressions that existed during the periods of intermittent inactivity were filled with alluvium and clays. The topography and surface geology of the city are largely the result of the Cenozoic volcanic processes (Saggerson, 1991).

The main types of soils Westlands Constituency are the black cotton and the red soils that form patches in different parts of the County. The proposed site is characterised by deep, well drained, red nitisols soils.

3.4.6 Hydrogeology

The Nairobi groundwater basin extends from the zone of north-south rift faulting west of the city (with an elevation of about 2400 m ASL) towards the Athi river floodplain (with an elevation of 1500 m ASL) east of the city center. Volcanic activity has controlled the geomorphologic evolution – the rocks of the Nairobi basin mainly comprising a succession of volcanic lavas and ashes (tuffs), whose thickness reaches some 400 m underneath the city itself and which eastward gradually merge into to the Tertiary deposits of the Athi floodplain.

The volcanic rocks show a wide range of porosity and permeability and have developed aquifer units separated by lower permeability strata. The aquifers mainly comprise of the Kerisha Valley Series and Upper Athi Series (transmissivity of 5-50 m²/d and low storativity). The extension of this multi-layered aquifer system is fairly well known from the many boreholes that have been drilled to depths of 100-350 m (Stephen Foster & Albert Tuinhof, 2005).

3.4.7 Ambient Air Quality at project site

Measurement was conducted within the perimeter boundary of the facility site. The objective of the measurement was to obtain the concentration of PM_{2.5}, PM₁₀; Total suspended particulate (TSP), SO₂, NO₂, H₂S, O₃ and Total VOCs.

The standards used to evaluate the measured values are derived from the 2nd Schedule of the EMC (Air Quality) Regulations, 2014 for ambient air quality.

Particulate Matter (TSP, PM₁₀ & PM_{2.5}) measurements was done using Oceanus Air Quality Monitor system (AQM-09) Environmental Monitor machine for both particulates and gaseous concentrations. The gases, (SO₂, O₃, NO₂, H₂S & Total VOCs) were sampled using the AQM-09 Pollution Monitoring machine. The air pollution levels are reported instantaneously and in real-time into online monitoring platform.

The measuring points includes: South western boundary fence facing Waiyaki way (beside the administration block), at the Covid center next to the spring valley estate fence boundary, at the southern boundary next to the C gate, western boundary on top of the watch tower next to the material loading area, in-front of the accident and emergency block (site) and at the main gate entrance; The particulate matter (PM^{2.5}) measured at the listed areas were within the EMC (Air Quality) Regulations; Particulate matter PM₁₀ and TSP levels measured at the listed areas were within the EMC (Air Quality) Regulations, 2014.

The results for SO₂, NO₂, H₂S, O₃ and Total VOCs were all within the EMC (Air Quality) Regulations 2014 at the plant perimeter for all the locations sampled.

(Full Report on Ambient Air Quality Monitoring at the site is attached herewith the report).



Plate 6: Ambient Air Quality and Noise level measurements at the site

3.4.8 Noise Level measurements at project site

The objective of the survey was to provide sufficient noise data to identify the current noise conditions. The measurements were carried out during diurnal schedule at six monitoring locations within the boundary of the facility and this was to determine and characterize existing ambient noise levels.

The noise environment at all the monitoring locations was generally similar in character, with the main noise sources being activities within the construction site and traffic along the Waiyaki way and red hill roads as well as of lorries bringing raw materials, wheel loaders, batch concrete mixing activities and typical urban activities within the vicinity of the facility.

The noise results show that all the points' diurnal measured results LAeq were within the IFC/World bank guidelines with two monitoring location (SW boundary point 1 and COVID area point 2) of the six points having their results within the Environmental management and coordination Act (LN. 61 of 2009) while the remaining four locations being above the same guidelines due to their close proximity to the road and associated site activities. (See attached full report on noise level monitoring)

3.5 Infrastructural facilities

3.5.1 Electricity

Nairobi County has the highest access to electricity with 72.1% of the population relying on the utility for lighting in comparison to other counties such as Murang'a, which had the least electricity penetration of 13.8% according to a KNBS and SID International's National Inequality Survey carried out in 2013.

According to the Kenya Power Financial Report 2017, the Nairobi Metropolitan Area consumes more than 50.0% of Kenya's electricity supply. This is largely a result of the industrial nature of the capital city with majority of Kenya's manufacturing industries based in Nairobi in areas such as the Industrial Area and along Mombasa Road, and its satellite towns such as Ruiru and Thika. Furthermore, in addition to being the main commercial hub in Kenya, Nairobi is regarded as one of the key regional hubs in the continent, and thus it hosts several local and international firms. Key business nodes include Upperhill, Central Business District, Westlands and Kilimani areas.

The project area gets the bulk of its energy supply from the Kenya Power and Lighting Company (KPLC) and the Kabete Barracks is already connected to the natural grid.

3.5.2 Water & Sewerage

Nairobi City Water and Sewerage Company (NCWSC) was incorporated in December 2003 under the Companies Act cap 486. It is a wholly-owned subsidiary of Nairobi City County with the main responsibility of providing and managing water and sewerage services in Nairobi, while the asset holding body, Athi Water Works Development Agency (AWWDA) is charged with the responsibility of developing key water and sewerage infrastructure (NCWSC).

3.5.2.1 Water Supply

Nairobi City is the international, regional, administrative and economic hub for Kenya. The city generates approximately 60% GDP but faces chronic water shortages including its surrounding areas.

The completion of the Northern Water Collector Tunnel which targets to increase water supply to Nairobi City County is expected to increase water capacity at Ndakaini dam in Murang'a County, Nairobi's main water source. The tunnel which draws water from three rivers namely, Maragua, Gikigie and Irate is being done by the Athi Water Works Development Agency (Athi Water Works Development Agency).

The main supplier of water in the project area is the *NCWSC* which is governed by constant rationing hence residents rely on other water sources such as boreholes, wells, rain water and water boozers.

The project site, Kabete Barracks is also connected to the NCWSC water pipeline and supplemented by 2 on-site boreholes.

3.5.2.2 Sewerage services

Nairobi County is largely served by the Nairobi City Water and Sewerage Company sewer line. In areas not served by the sewer line, residents rely on septic tanks and other forms of improved sanitation such as pit latrines and bio-digesters.

The project area is served by the NCWSC sewer line. However, the proponent will install a WWTP on site to ensure treatment and recycling of the waste water.

3.5.3 Transport Network

Nairobi city has witnessed an expansion in its transportation infrastructure. The road network continues to be expanded, the commuter rail transport system has been refurbished and plans are underway to introduce the bus rapid transit (BRT) system.

3.5.3.1 Roads

The current road network in Nairobi County and its environs is fast expanding under the Vision 2030 – Expansion of Roads Programme aimed at enhancing domestic and regional trade through upgrading of the national and county roads network.

Such projects in the County include the recently commissioned 27 km Nairobi Expressway links Westlands with the Mlolongo area on Mombasa Road while cutting across the CBD and the Jomo Kenyatta International Airport on Mombasa Road. The road has significantly reduced the peak travel time on Mombasa road from approximately two hours to between 10 and 15 minutes (<https://estateintel.com/from-mombasa-road-to-westlands-in-15-minutes-why-you-should-pay-attention-to-the-nairobi-expressway>).



Figure 8: The Nairobi Express Way Map (Source: <https://res.cloudinary.com>)

Other projects include expansion of the Waiyaki Way, James Gichuru Road, Eastern Bypass from City Cabanas to Ruiru, connection to the Nairobi Inland Container Depot (ICD) and North Airport road to Outer Ring through Umoja to Dandora and ending at Baba Dogo among others.

The project area is well served by a good road network the main roads in the project area being Waiyaki way, James Gichuru Rd, Westlands – Redhill Link road, Nairobi Express way.

The site is accessible from Waiyaki Way, Northern By-Pass, James Gichuru Road and Red Hill Link Road.



Plate 7: Waiyaki Way and the Express Way (Project site to the left)

3.5.3.1 Airports

Nairobi County hosts 3 airports; Jomo Kenyatta International Airport, Wilson Airport and Moi Air Base. Jomo Kenyatta International Airport (JKIA) is the biggest Airport in East and Central Africa, and is the focal point for major aviation activity in the region while Wilson Airport is the second airport in the County.

Moi Air Base, formerly known as RAF Eastleigh and Eastleigh Airport is a military airport located to the east of Nairobi, in the Eastleigh. The airport is used by the Kenya Air Force. Additionally, the air base is the home of the East African School of Aviation run by the Kenya Civil Aviation Authority. The airport is also used to train Kenyan Air Cadets.

3.5.3.2 Railway Network

Rail transport in Kenya consists of a metre-gauge network and a new standard gauge railway (SGR). Both railways connect Kenya's main port city of Mombasa to the interior, running through the national capital of Nairobi. The metre-gauge network runs to the Ugandan border, and the Mombasa–Nairobi Standard Gauge Railway.

Passenger service between Mombasa and Nairobi is available on the Mombasa–Nairobi Standard Gauge Railway. The Revitalized Nairobi Commuter Railway Service was recently commissioned by H.E the President, Uhuru Kenyatta on 10TH November 2020. The Service had been undergoing major infrastructure changes to integrate and expand different components with the aim of modernizing and upgrading the existing

infrastructure. The main components of the upgrade being construction of new and modernization of existing stations, acquisition of Diesel Multiple Units (DMUs), refurbishing of passenger coaches, rehabilitation of locomotives and other rolling stock and planned rehabilitation of the entire network deployed under commuter rail services.

The Nairobi Commuter Railway service is envisaged to improve the level of service of the commuter passengers, increase safety of operations and reduce the transit time of the trains (KRC)

3.5.4 Health

Kenya health system is broadly categorised into 6 levels. Level 1 comprising of the community and outreach level of care, level 2 representing dispensaries, level 3 representing health centres and clinics, level 4 representing sub-county hospitals, level 5 is the County /secondary care referral hospitals and level 6 consisting of national referral hospitals and large private teaching / mission (faith-based) hospitals (CIDP, 2018).

Kenyatta National Hospital & Kenyatta University Teaching, Research, and Referral Hospital (KUTRRH) are the major Level 6 referral hospitals in the County while the Defence Forces Memorial Hospital is the sole referral hospital for security forces in Kenya. The proposed KFRRH is therefore expected to complement the DFMH.

3.5.5 Land Use

Land use/cover in Nairobi County is changing rapidly because of the increased interactions of human activities with the environment as population increases. With the continued high rate of urbanization, the County Government has a duty to use planning controls to ensure that development is allowed only where it is needed, while ensuring that the character and amenity of the area are not adversely affected. The City Planning department therefore defined zones for different types of developments/ uses which have been spelled out in the City Council of Nairobi (2004) Guide of Nairobi City Development Ordinances & Zones.

The proposed site is located within Kabete Barracks, which seats on a 30 Acres (12.409Ha) parcel of land owned by the MoD. The site is in Zone 20 that includes Gazetted Public/Strategic Reserved Areas and allows for Special/strategic facilities and Developments such as Military Sites, State House, JKIA Airport, Wilson Airport. The proposed project is therefore compatible with the land use for that parcel of land which has been designated for military use/ activities.

The neighbouring land uses are mainly Institutional, commercial/ Offices/ Residential; multi-storey buildings such as ABC place to the South, PKF building and residential houses to the North.



Figure 9: Proposed site and neighbourhood showing different land uses.

CHAPTER 4

4. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK

4.1 General

This chapter presents a discussion of the various national policies, rules and regulations that are applicable to the implementation, operation and decommissioning phases of the proposed project. In addition, relevant international conventions, agreements and protocols have also been discussed. A review of the various policies, rules, regulations is intended to guide the proponent in carrying out project activities in adherence to the law governing the various sectors linked to the health facility.

4.2 National Policies Relevant to the proposed Project

Table 4.1: The Constitution of Kenya and National Policies

Policy	Requirements	Relevance to the proposed project
The Constitution of Kenya	The Constitution of Kenya, 2010 provides a broad framework along which all national and sectoral legislative documents are drawn. In relation to the environment, article 42 of chapter four, <i>The Bill Of Rights</i> , confers to every person the right to a clean and healthy environment, which includes the right to have the environment protected for the benefit of present and future generations through legislative measures, particularly those contemplated in Article 69, and to have obligations relating to the environment fulfilled under Article 70. Chapter 5 of the document provides the main pillars on which the environmental statutes are hinged. Part	In conformity with the Constitution of Kenya, every activity or project undertaken within the republic must be in tandem with the state's vision for the national environment as well as adherence to the right of every individual to a clean and healthy environment. The proposed project is a central development activity that utilizes sensitive components of the physical and natural environment hence need for a clearly spelt out environmental management plan to curb probable adverse effects to the environment.

	1 of the chapter dwells on land, outlining the principles informing land policy, land classification as well as land use and property. The second part of this chapter directs focus on the environment and natural resources. It provides a clear outline of the state's obligation with respect to the environment.	
The National Environment Policy, 2013	This policy framework was formulated to ensure sustainable management of the environment and natural resources for sustainable development. Objectives of the policy includes the provision of a framework for integrated approach to planning and sustainable management of Kenya's environment and natural resources; Strengthen the legal and institutional framework for good governance, effective coordination and management of the environment and natural resources; and ensure sustainable management of the environment and natural resources, such as unique terrestrial and aquatic ecosystems, for national economic growth and improved livelihoods.	The project shall be implemented guided by the core principles of the policy of a clean and healthy environment and a duty to safeguard and enhance the environment, the right to development in consideration of sustainability, resource efficiency and economic, social and environmental needs. Environmental resources will be utilized in a manner that does not compromise the quality and value of the resource or decrease the carrying capacity of supporting ecosystems and in support of the stakeholders
Vision 2030 Kenya	The Vision 2030 Medium Term Plan 2018-2022 states that the Kenya Government aims at the improvement of health facilities and establish four (4) Comprehensive Cancer Centres	A comprehensive cancer unit will be part of the planned construction of the KFRRH in line with the government policy of improving and modernizing its health facilities by 2030
Health Care Waste Management Strategic Plan 2015-2020	The National Health Care Waste Management Plan of Action is a document intended for use by health managers and programme officers across the health sector (including those in the private health sector).	The plan recommends a holistic approach that includes clear delineation of responsibilities, occupational health and safety programmes, waste minimization and segregation. This document is

	<p>The purpose of developing this plan was to provide a tool that gives health managers guidance in planning, implementing and monitoring the activities of health care waste management in health facilities. This plan describes the situation of health care waste management on the basis of a survey which was conducted in order to document the situation of waste management in Kenya.</p>	<p>designed to provide viable options to address the challenges encountered in planning for health care waste management in Kenya and that should be followed by project implementers.</p>
<p>National Infection Prevention and Control Guidelines for Health Care Services in Kenya, 2010</p>	<p>These guidelines are intended to provide administrators and Health Care Workers with the necessary information and procedures to implement Infection Prevention Control (IPC) core activities effectively within their work environment in order to protect themselves and others from the transmission of infections. They provide information on the following topics:</p> <ul style="list-style-type: none"> • The infrastructure, equipment, and supplies that are necessary to implement standard and • Additional (transmission-based) precautions for IPC • Procedures for cleaning, disinfecting, and reprocessing reusable equipment • Managing health care waste • Protecting health care workers from transmissible infections • IPC practices in special situation 	<p>These guidelines are applicable to the proposed project to prevent and control infectious diseases in health care institutions.</p>
<p>National Land Policy of 2009</p>	<p>The policy recognizes that land is critical to the economic, social, and cultural development of Kenya and that the use of land in urban and rural areas as well as in the land/water interface has been</p>	<p>The planning principles outlined in this policy should guide the process of implementation of the proposed project and public participation, a major component environmental assessment and audits</p>

	<p>a major area of concern to all Kenyans. Problems of rapid urbanization, inadequate land use planning; unsustainable production, poor environmental management, inappropriate ecosystem protection and management are commonplace and require appropriate policy responses. The policy further recognizes that land use planning is essential to the efficient and sustainable utilization and management of land and land based resources and gives guidelines on development of land in urban and peri-urban areas. The policy recognizes Environmental Assessment and Audit as Land Management Tools</p>	<p>should always be carried out to ensure that all stakeholders are aware of any planned project activity.</p>
<p>The National Environmental Action Plan (NEAP) 2009 - 2013.</p>	<p>The NEAP was a deliberate policy effort to integrate environmental Considerations into the country's economic and social development. The integration process was to be achieved through a multi-sectoral approach to develop a comprehensive framework to ensure that environmental management and conservation of natural resources are an integral part of societal decision making. The NEAP proposes interventions of identifying environmental problems and issues, raising environmental awareness, building national consensus, defining policies, legislation and institutional needs and planning environmental projects.</p>	<p>The proposed project will interact with the various elements and components of the physical, social and economic environments in ways that could lead to negative impacts. Issues of environmental integrity will be addressed through robust environmental assessment processes.</p>

4.2 Legal Framework

The proponent (KDF), project implementing agencies and state lead agencies have a legal duty and responsibility to ensure that the various national statutes and regulations are strictly adhered to, to safeguard the environment, public health and safety. Table 5.2 gives a brief discussion of the key national and sectoral laws that have direct relevance to the proposed project.

Table 4.2: Relevant Legal Framework

Legislation / Act	Requirements	Relevance to the proposed KFRRH project
Environmental Management and Coordination Act, 1999 (EMCA)	The Environmental Management and Coordination Act 1999 was amended in 2015 and provides for the establishment of an appropriate legal and institutional framework for the management of the environment and for matters connected therewith and incidental thereto. Section 58(1) of the Act states that “notwithstanding any approval, permit or licence granted under this Act or any other law in force in Kenya, any person being a proponent of a project shall, before carrying out, executing, or conducting or causing to be financed, commenced, proceeded with, carried out, executed or conducted by another person any undertaking specified in the second schedule to this Act submit an Environmental Impact Assessment Project report”	Environmental Management and Coordination Act provide a legal and institutional framework for the management of the environment- related matters. This report has been prepared pursuant to section 58 (1) of this Act. The proponent is expected to comply with Part II on General principles by ensuring that environmental conservation and protection are given the priority throughout project’s life span. Other sections that the proponent should comply with include Part VII Section 71 (1) on water quality Standards, Section 78 on air quality standards, Section 86 on standards for waste, and Section 101 on standards for noise. These should be done by avoiding acts of pollution of water, air; ensuring that proper infrastructure for solid waste management is developed and noise levels especially during construction period are within regulatory limits stipulated in the Noise and Excessive Vibrations Pollution (Control) Regulations 2009.

<p>Environmental Impact Assessment and Audit regulations 2003.</p>	<p>The EIA and Audit Regulations 2003 and the EIA and Audit (Amendment) Regulation 2016. These regulations stipulate how an ESIA study report should be done. They highlight stages to be followed, information to be made available, role of every stakeholder and rules to observe during the whole ESIA process</p>	<p>The proponent shall undertake the ESIA study as outlined in Part III of the regulations. The TORs shall be prepared and socio-cultural and economic issues related to the project considered. The proponent shall prepare the study report according to regulations stipulated under Part IV on the contents of the study report.</p>
<p>The Physical and Land Use Planning Act, 2019</p>	<p>In consideration to relevant national and county policies; Section 56 of the Act gives County Governments the power within their jurisdiction to:</p> <ul style="list-style-type: none"> (a) prohibit or control the use and development of land and buildings in the interests of proper and orderly development of its area; (b) control or prohibit the subdivision of land; (c) consider and approve all development applications and grant all development permissions; (d) ensure the proper execution and implementation of approved physical and land use development plans; (e) formulate by-laws to regulate zoning in respect of use and density of development; (f) reserve and maintain all the land planned for open spaces, parks, urban forests and green belts in accordance with the approved physical and land use development plans; and <p>Section 57 & 58 requires a person to apply for a development permit from the respective county</p>	<p>The proponent should adhere to the provisions of this Act and any regulations thereof for the proper and orderly development of the area. The proponent should apply for the relevant development permits and pay requisite permit fees as required by the Act before commencement of the development.</p>

	<p>executive committee member before carrying out any development within a county.</p> <p>The Act under section 59(1) requires a person applying for development permission to ensure that any documents, plans and particulars submitted in the application have been prepared by the relevant qualified, registered and licensed professionals.</p> <p>Section 75(1) states that the National Physical and Land Use Planning Liaison Committee shall—</p> <p>(a) advise the Cabinet Secretary on broad physical and land use planning policies, strategies and standards; and</p> <p>(b) hear and determine appeals under this Act or as may be provided for under any other written law.</p>	
<p>County Government Act 2012</p>	<p>It provides for county governments’ powers, functions and responsibilities to deliver services. The Act contains Principles of Citizen Participation in counties and stresses protection and promotion of the interest and rights of minorities, marginalized groups and communities and their access to relevant information. Section 102 on Principles of Planning and development facilitation in a County stresses the need to protect and integrate rights and interest of minorities and marginalized groups and communities and protect and develop natural resources in a manner that aligns national and county government’s policies. The planning process should serve as a basis for</p>	<p>This piece of legislation stresses the need to bring everyone on board in planning and execution of development projects at the County level. However, it should be noted that this is a sensitive project and the public may not be involved in the planning and implementation of the proposed hospital. Therefore the proponent should take all the necessary measures to protect the citizens and natural resources from adverse environmental and health impacts. Conservation and protection of natural resources within the area must therefore be a significant component of this project to ensure sustainability.</p>

	engagement between county government and the citizenry, other stakeholders and interest groups.	
The Water Act 2016	<p>The Act declares that every person in Kenya has the right to clean and safe water in adequate quantities and at reasonable standards of sanitation.</p> <p>Pollution of water resources is prohibited in Part VIII, section 143 of the Act. Any rubbish, dirt, refuse, effluent or any other offensive matter shall not be allowed near or in water resources. Section 144 states that a person who pollutes will be required to clean up the pollution caused or remedy any harm caused.</p> <p>Section 18 of this Act provides for national monitoring and information systems on water resources. Following on this, sub-section 3 mandates the water Resources Management Authority to demand from any person or institution, specified information, documents, samples or materials on water resources. Under these rules, specified records may require to be kept by site operator and the information thereof furnished to the authority</p> <p>The act states that a permit is required for the discharge of a pollutant into any water resource.</p>	<p>The site has two existing boreholes on site and water is mainly drawn for construction purposes. The proponent shall ensure that no waste, effluent or offensive matter is allowed near or into the boreholes or to the rivers in the neighbourhood. A permit shall be obtained for any water abstraction for use in the project in accordance to the provisions of this Act. All records of water abstraction should be kept and water quality tests undertaken to ascertain the safety of water drawn for use.</p>
The Land Act 2012	<p>The Land Act vests the procedures for compulsory acquisition of land in the National Land Commission on behalf of an entity requiring land for a public purpose or public interest, and provides under Section 111(1) states that if land is acquired compulsorily,” just compensation shall be paid promptly in full to all</p>	<p>Land for the project belongs to the proponent (Kenya Defense Forces) and there is no requirement for additional land. Therefore there shall be no relocations save for the existing KDF temporary houses which shall be demolished.</p>

	<p>persons whose interests in the land have been determined”.</p> <p>Section 148(1) provides for compensation for a way leave in case of private land to any person in lawful or actual occupation as assessed by a qualified valuer in respect of:</p> <ol style="list-style-type: none"> 1. The use of the land 2. The damage suffered in respect of trees, crops, buildings on the route of the way leave 3. The damage suffered during any preliminary work undertaken in connection with surveying or determining the route of that way leave. <p>Section 148(5) provides for recourse to Land and Environment Court for a person entitled to compensation for way leave who is dissatisfied with the amount, mode of payment and time taken to make payment.</p>	<p>Already new houses have been built to move the officers on site to pave way for construction.</p>
<p>The Environmental Management and Coordination (Air Quality) Regulations 2014</p>	<p>Part II of the regulations stipulates that no person shall emit any liquid, solid, or gaseous substance or cause emission of priority air pollutants to exceed ambient air quality limits prescribed in the First Schedule.</p> <p>Part VI Regulation 25 sub-regulation (2) and (5) requires every operator or owner of a mobile emission source including road, rail, air, marine and inland water transport and conveyance equipment, to control</p>	<p>It’s the duty of the proponent and the contractor to ensure that the Air Quality regulations are strictly adhered to during construction, operation and decommissioning phases of the project. the contractor should ensure that dust, vehicle exhaust fumes should not exceed the standard limits. During operation, the hospital will be equipped</p>

	<p>the emission of priority air pollutants set out in the Second Schedule. Any person who causes emissions from a mobile source in excess of the prescribed standards commits an offence.</p> <p>Part VII regulation 29 (1) requires the occupier or operator of premises to ensure that exposure of indoor air pollutants does not exceed the exposure limits stipulated under the Factories and Other Places of Work (Hazardous Substances) Rules or under any other relevant law.</p> <p>Part VIII regulation 32 prohibits any person from operating construction equipment or handling construction material to allow emission of particulate matter during the demolition of structures, buildings, or parts of buildings in such a manner as to adversely affect the limits set out in the First schedule</p> <p>Regulation 34 further prohibits any person not to cause or allow stockpiling or other storage of material in a manner likely to cause ambient air quality levels to be destroyed.</p>	<p>with standby power generators and incinerators which should be well maintained and serviced to prevent release of toxic gases beyond limits to the atmosphere. These will ensure that quality of the environment is safeguarded as well the safety and health of workers and the public.</p>
<p>Occupational Safety and Health Act (OSHA), 2007 Cap 514 Laws of Kenya</p>	<p>The Act makes provision for the health, safety and welfare of persons employed in factories and other places of work. The provision requires that all practicable measures be taken to protect persons employed in the factory and other places of work from any injury. The provisions of the Act are also relevant to the management of hazardous and non- hazardous wastes, which may arise at the project site. The Act provides that all measures should be taken to ensure</p>	<p>The provisions of this Act apply to the various stages of the project’s full life cycle. It’s therefore important that the contractor and the proponent thoroughly read, understand and apply the provisions of this Act. Activities associated with construction such as excavation of trenches, movement of construction vehicles, the use of equipment and the congregation of workers and</p>

	safety, health and welfare of all the stakeholders in the work place.	staff on site increase the risk of occupational injury. The contractor should formulate safety rules which all employees must comply with. An emergency response plan, warning signs, machinery safety provisions and construction safety provisions must be in place to avoid or minimize injuries at the work place. During the operation period there will be occupational and safety risks necessitating the application of the act.
Ministry of Health (Covid 19 protocols and Regulations)	The Ministry of Health has formulated protocols and guidelines on Covid 19 management. These touch on areas such as isolation and quarantine, testing and vaccination, counseling and mental health, travel and prevention measures.	The contractor and proponent must ensure that the protocols and guidelines are adhered to for the prevention of spread of Covid 19 disease
Environmental Management and Co-ordination (Water Quality) Regulations, 2006	These Regulations apply to drinking water, water used for industrial purposes, water used for agricultural purposes, water used for recreational purposes, water used for fisheries and wildlife, and water used for any other purposes. The Regulations provide for prevention of water pollution. They require every person to refrain from any act which directly or indirectly causes, or may cause immediate or subsequent water pollution. The regulations also require that no person shall throw or cause to flow into or near a water resource any liquid, solid or gaseous substance or deposit any such substance in or near it, as to cause pollution.	The proponent must undertake strict preventive measures to avoid water pollution that may arise from oil spills/leakages, chemical spills and soil erosion due to improper management of soils during rainy seasons. These may lead to contamination of ground and surface water bodies. Water quality monitoring and analysis requirements of these regulations should be strictly complied with.

The Work Injury Compensation Benefit Act 2007	Part III of the act stipulates the right to compensation to employees who get injured, diseased or die at the work place. All accidents should be reported by the employer to the relevant authorities. Occupational diseases are defined and compensation criteria described under the Act. The Act includes compulsory insurance for employees. Part VII gives details on medical aid to injured or diseased workers.	All workers contracted during the project implementation phase are entitled to medical and life insurance as required by the act. Accidents occurring at the work place should be reported to the Directorate of Occupational Health as the Act stipulates. Appropriate medical aid should be given to those injured at site at prescribed medical facilities.
The Environmental Management and Co-ordination (Wetlands, River Banks, Lake Shores and Sea Shore Management) Regulations, 2009	Part III section 16-17 states that every owner, occupier or user of land which is adjacent or contiguous to a wetland shall undertake special measures, including prevention of soil erosion, siltation and water pollution for the protection of river banks, lake shores and the seashore.	The proponent and contractor should take special measures to prevent soil erosion, siltation and pollution of rivers or lakes from the proposed construction and operation activities. Stock piles of soils at site and dumping grounds should be managed properly to prevent erosion.
The Penal Code Cap 63	Chapter XVII on “Nuisances and offences against health and convenience” contained in the Penal Code strictly prohibits the release of foul air into the environment which affects the health of the persons. It states “Any person who voluntarily vitiates the atmosphere in any place so as to make it noxious to the health of persons in general dwelling or carrying on business in the neighbourhood or passing along a public way is guilty of a misdemeanor”,	The proponent should comply with the provisions of the Code prohibiting fouling of air (section 192 by ensuring that operation of the proposed facility does not lead to releases of pollutants into the local atmosphere. Noise and air pollution should be avoided throughout the lifespan of the project through institution of the necessary mitigation measures.
	The Act contains a comprehensive provision on discharges of pollutants into watercourses. The Act makes it the duty of every local authority (in the	The proponent and the contractor should comply with this Act by implementing the various

<p>The Public Health Act Cap 242 Laws of Kenya</p>	<p>capacity of “health” authority) to take all lawful, necessary and reasonably practicable measures to safeguard and promote public health. Section 13 Part IX of the Act deals with sanitation and housing, and is of most significance for the control of polluting discharges. Section 116 imposes a duty on every local authority to maintain its district in a clean and sanitary condition, to prevent nuisances and prosecute those responsible for nuisances. Nuisances include drains and sewers for the discharge of pollutants into watercourses and lakes. Section 126 of the Public Health Act empowers the Minister to make rules on among others the drainage of lands, streets or premises, the disposal of offensive liquids, and the removal of, <i>inter alia</i>, waste matters and the standards of purity of any liquid which, after treatment in any purification works, may be discharged as effluent;</p> <p>The Act also makes provision for protecting from pollution sources of drinking water supply. Section 129 makes it the duty of the local authorities to prevent such pollution, to purify a pollution source and to prosecute the polluters. The Minister may make, and require local authorities to enforce rules for preventing polluting activities threatening such drinking water supply, and for purifying polluted water.</p>	<p>provisions of Part IV on Prevention and Suppression of infectious diseases. The proponent should also put in place measures to mitigate all forms of nuisance in compliance with Part IX Sections 115 and 118 of the Act. In this regard, noise level, water quality and, air quality should be maintained at stipulated standards during construction and operation processes of the project. Solid waste arising from project related activities should be managed in compliance with provisions of this Act.</p>
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<p>National Construction Authority (NCA) Regulations 2014</p>	<p>Part II – Contractor must be registered by NCA and with the Association of contractors, employ qualified persons. Part IV- All construction works or projects whether in private or public must be registered with NCA as soon as the tender for construction is awarded Part V – all construction workers and site supervisors must be accredited and certified under the NCA Regulations 2014</p>	<p>It is the duty of the proponent to ensure that the contractor is registered by the authority and that all the skilled construction workers and site supervisors are registered, certified and accredited by NCA. All the provisions of the regulations must be followed to ensure the safety and the quality of construction work</p>
<p>Noise and Excessive Vibration Pollution (Control) Regulations of 2009.</p>	<p>Under Part II , section 3 on ‘General prohibitions’, the Regulations provide that no person shall make or cause to be made any loud, unreasonable, unnecessary or unusual noise which annoys, disturbs, injures or endangers the comfort, repose, health or safety of others and the environment. In determining whether noise is loud, unreasonable, unnecessary or unusual; various factors including time of the day; proximity to residential area; whether the noise is recurrent, intermittent or constant; and the level and intensity of the noise among others may be considered. Any person who contravenes the provisions of this Regulation commits an offence.</p>	<p>The proponent should comply with these regulations by ensuring that noise levels both during construction and operation phases of the project do not exceed those stipulated in the First Schedule of the regulations. Where the levels are exceeded, mitigative measures including wearing ear protection and carrying out construction activities during daytime should be put in place.</p>
<p>Environmental Management and Co-ordination (Waste</p>	<p>These Regulations apply to all categories of waste including solid waste, industrial waste, hazardous waste, pesticides and toxic substances, biomedical wastes and radioactive substances</p>	<p>A wide range of wastes will be produced during construction, operation and decommissioning phase of the project. The proponent should comply with this regulation by obeying stipulations of the general provisions of the</p>

<p>Management) Regulations 2006</p>	<p>Part II of the Regulations prescribes responsibility of waste generators. It states that no person shall dispose of any waste on a public highway, street, road, recreational area or in any public place except in a designated waste receptacle. The regulations also require any person whose activities generate waste to collect, segregate and dispose or cause to be disposed of such waste in the manner provided for under the Regulations.</p> <p>The Regulations also provide for any person who owns or controls a facility or premises which generates waste to minimize the waste generated by adopting cleaner production principles which includes among others: improvement of production process through conservation of raw materials and energy; eliminating the use of toxic raw materials within such time as may be prescribed by the Authority and reducing toxic emissions and wastes, monitoring the product cycle from beginning to end.</p>	<p>regulations including responsibility of waste generators and segregation of waste by generator. The Proponent and contractor should engage licensed solid waste to dispose of solid waste generated at the premises both during construction and operation phases in compliance with provisions of this regulation. The hospital should install at site state of the art incinerators to manage biomedical wastes</p>
<p>The Energy Act 2019</p>	<p>Under section 148 of the act, a person who wishes to carry out electrical installation work must be licensed as an electrical contractor by the Authority (The Energy and Petroleum Regulatory Authority). Section 149 further prescribes the requirements of persons who wish to be certified as electrical installation workers.</p> <p>Section 153 and 154 requires that the amount of electrical energy supplied to the consumer shall be</p>	<p>The proponent should engage contractors and electricians that are qualified and duly certified by the authority for all electrical work within the hospital. The contractor should ensure that electrical energy supplied is metered as required by the act. Alternative renewable energy sources should be explored and adopted as an alternative to electric energy.</p>

	<p>ascertained by the use of approved meters by Kenya Bureau of Standards (KBS).</p> <p>Part IV Section 75 provides for the development and use of renewable energy technologies, including but not limited to biomass, biodiesel, bioethanol, charcoal, fuelwood, solar, wind, tidal waves, hydropower, biogas and municipal waste.</p>	
The Standards Act Cap 496	<p>This Act establishes the Kenya Bureau of Standards. Its main objectives are to:</p> <p>a) to make arrangements or provide facilities for the testing and calibration of precision instruments, gauges and scientific apparatus, for the determination of their degree of accuracy (b) to provide facilities for the examination and testing of commodities and any material or substance from or with which and the manner in which they may be manufactured, produced, processed or treated; (c) to prepare, frame, modify or amend specifications and codes of practice</p>	<p>Construction inputs, materials and equipment that will be used during operation should conform to the standards of the Kenya Bureau of Standards (KBS) in order to ensure sustainability and safety</p>
Radiation Protection Act, Cap 243	<p>The aim of the Act is to control the import, export, possession and use of radioactive substances and irradiating apparatus. Under this Act in section 9, a license is required to handle any radioactive substances or irradiating apparatus from the National Radiation Protection Board. Handling here includes the method of disposing of radioactive waste products, transportation of radioactive materials, storage, use and maximum working hours</p>	<p>A radiotherapy unit is proposed to be part of the hospital and the provisions of this act will guide the proponent on the use of radiation, management and disposal of radiation wastes. Under this Act also, institutions generating this category of waste shall be expected to apply for a license from the same board.</p>

	that employees are expected to work with radioactive materials.	
Petroleum Act 2016	<p>It sets out numerous requirements relating to fire safety precautions in handling and storage of petroleum. The following must be clearly defined that is the position of the premises in relation to adjoining property; The position and capacity of all tanks, storage sheds and filling stations, the position of all buildings, structures or other works within the installation, and the manner in which the petroleum is to be stored; • All lighting arrangements • Containment should be provided where petroleum storage is above ground</p> <p>Part III Section 22 specifies that the distances between tanks and between tanks and other buildings and between tanks and the boundaries of the installation shall, where the tanks are constructed below or partially below ground in accordance with the provisions of paragraphs (1) and (2) of rule 24 of the rules, and, in the case of tanks constructed above ground level the spacing shall be as specified in the schedule in Section</p>	The project shall have underground oil storage facilities and should be constructed and operated according to rules of the petroleum Act
EMCA (Plastics Bags Control and Management) Regulations, 2018	<p>These regulations are to ensure a clean and healthy environment through prevention of pollution caused by plastic bags and promotion of alternative biodegradable packaging materials. They also apply to all plastic bags used for packaging. No person shall manufacture, import, export, use or offer for sale plastic carrier or flat bags. However the</p>	<p>During operation, the proponent will require Printed hazardous/biomedical waste plastic liners and garbage bag to manage its waste. It is important to note that the proponent shall be required to make an application for permission to manufacture, import or use the said bags.</p>

	authority may exempt industrial manufacture of industrial printed flat bags, Printed hazardous/biomedical waste plastic liners d) Printed garbage bag	
Occupiers' Liability Act Cap 34	Under Section 3 of the Act, an occupier of premises owes the common duty of care to all his visitors, except in certain restrictions, modifications or exclusion to a visitor by agreement. The common duty of care is defined, as the duty to take care as in all circumstances of the case is reasonable to see that the visitor will be reasonably safe in using the premises.	The proponent and contractor should put in place measures to ensure that safety of workers and visitors to the facility are guaranteed both during construction and operation phases of the project. This can be done through putting in place stringent security measures to guard against criminals accessing the premises; including twenty four hour security surveillance. Firefighting equipment including fire extinguishers should be installed within the premises as a measure to deal with fire emergencies.

4.3 Regulatory Framework

4.3.1 National Environment Management Authority, NEMA

NEMA is the regulatory body charged with management and coordination of environmental issues. The object and purpose for which the Authority was established is to exercise general supervision and co-ordination over all matters relating to the environment and to be the principal instrument of Government in the implementation of all policies relating to the environment.

Regulatory function

- Co-ordinate the various environmental management activities being undertaken by the lead agencies and promote the integration of environmental considerations into development policies, plans, programmes and projects.
- Identify projects and programmes or types of projects and programmes, plans and policies for which environmental audit or environmental monitoring must be conducted under this Act;
- Monitor and assess activities, including activities being carried out by relevant lead agencies, in order to ensure that the environment is not degraded by such activities.

4.4 International Conventions and Protocols

4.4.1 Basel Convention

The Basel convention on the control of Transboundary movement of hazardous wastes and their disposal is an international treaty that was designed to reduce the movement of hazardous wastes between nations and specifically prevent transfer of hazardous waste from developed to less developed countries. The convention is also intended to minimize the amount of toxicity of wastes generated to ensure their environmentally sound management as closely as possible to the source of generation and to assist the less developed countries in environmentally sound management of hazardous and other waste they generate.

4.5 International Finance Corporation (IFC) Performance Standards/World Bank ESSs

The International Finance Corporation (IFC) Performance Standards/World Bank Environmental and Social Standards (ESSs) are designed to give guidance to the proponent to better manage the risks and impacts of proposed projects. The outcome of the analysis of performance standards ensures that the proposed projects are accepted, are environmentally and socially sustainable, and

informed decision in regard to projects is made. The relevant Environment and Social standard screened are indicated in the Table 4.3

Table 4.3: IFC Performance Standards/World Bank ESSs relevant to the project

Performance Standard/ESSs	Relevance	Explanation
ESS1. Assessment & Management of environmental and social risks and impacts	✓	This ESIA has been prepared through the scoping and screening of key environmental and social risks and impacts of the Project and identified appropriate mitigation measures to be implemented. Additional E&S plans have been prepared to manage project specific risks and impacts namely: i) Environment and Social Management Plan ii) Environmental Monitoring Plan iii) OHS and emergency response plan. The project shall obtain as appropriate, the necessary permits, consents and authorizations that are applicable to military institutions.
ESS 2. Labour and Working Conditions	✓	A Labour Management Plan (EMP) has been developed to guide on worker's social and labour issues and is attached to this report. The contracted workers and primary suppliers will sign a code of conduct (COC) on expected behavior and safety standards while attending to project activities. Engagement with workers and working conditions shall be line with the Employment Act 2007, Work Injury Compensation Benefits Act 2007 and occupational health safety act 2007, The project shall establish a mechanism of communication through which workers shall report their grievances to the proponent
ESS 3. Resource Efficiency and Pollution	✓	The project will use large quantity of resources that include water, energy and materials for construction. There is need to ensure resource efficiency through adequate management. A lot soil from excavation will be produced, construction wastes and risk of oil spills that may lead to pollution. In terms of efficiency, the project should ensure that the equipment procured is energy efficient to the extent possible.
ESS 4. Community Health and Safety	✓	There is a risk of accidents from vehicles transporting materials and waste out of side. Waste from the site if not properly managed can be a source of health and safety risks to the community. A traffic impact assessment has been undertaken.

ESS.5. Land Acquisition & Involuntary settlement	X	The ESS is not applicable as the land on which the project will be constructed belongs to the proponent.
ESS.6. Biodiversity conservation and sustainable management of living natural resources	X	There are no biodiversity at the site. This has been a built up and settled area.
ESS.7. Indigenous peoples	X	No indigenous people at the site
ESS.8. Cultural Heritage	X	No places or items of cultural heritage
ESS9. Financial Intermediaries	X	There are no financial intermediaries
ESS.10. Stakeholder Engagement and information disclosure	X	Stakeholder engagement has been going on between concerned government departments, the contractor and the team of consultants. Establishment of military facilities is a critical national security issue and public input is normally a challenge.

CHAPTER 5

5. POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS AND MITIGATION MEASURES

5.1 Introduction

This chapter presents the assessment of social, economic and environmental issues likely to arise as a result of implementation of the proposed project. For each issue, the analysis is based on its nature, the predicted impact, extent, duration, intensity and probability, and the values affected. Mitigation options are discussed for each potential and significant negative impact identified.

5.2 Impact identification

5.2.1 Sources of impacts

The impacts associated with the proposed project will emanate from project inputs, activities and outputs. They are as discussed below:

i. Project inputs

The project inputs that shall be potential sources of impacts include:

- Aggregate materials taken from the local sources including crushed rocks, stones gravel, steel and cement.
- Skilled and unskilled workforce exerting indirect demand for energy, water supply, sanitation, health services etc.
- Heavy machinery including excavators, earth moving equipment, cranes etc used in the project construction process.

ii. Project activities

a) Construction

- Site clearance and demolition
- Removal of vegetation cover
- Establishment of associated work and support infrastructure including construction camps, accessories etc.
- Obtaining raw materials e.g. water abstraction, quarrying etc
- Transportation of raw materials, machinery and labour to the site

- Excavation and backfilling
- Spillage (oil and fuel)

c) Operation activities

- Wastes generated from the medical facility (biomedical, organic, e-wastes)
- Transportation of goods and people
- General hospital repair and maintenance operations
- Discharge effluents

iii. Project outputs

The project outputs expected to lead to negative impacts include the following:

a) Construction wastes

- Eroded soil
- Surface runoff
- Refuse and sewerage wastes from construction camps
- Oil spills

b) Waste from hospital operations

- Vehicle emissions
 - ✓ NO_x
 - ✓ Hydrocarbons
 - ✓ Carbon dioxide
 - ✓ Carbon monoxide
 - ✓ Particulate (Diesel and dust)
- Hazardous wastes

5.2.2 Receptors of impacts

The anticipated negative impacts will be received by both the physical and human environments as below:

i) Human environment

- Settlements within the project site and its vicinity
- Sensitivity of the local population particularly with regard to:

- Public health consequences (during construction)
- Increased noise levels (during construction)
- Hazardous wastes (during operation)

ii) Natural environment

- Sites supporting terrestrial and aquatic flora
- Soil structure, stability and susceptibility to erosion

5.3 Impact Assessment criteria

An impact can be defined as any change in the physical-chemical, biological, cultural and/or socio-economic environmental system that can be attributed to human activities related to alternatives under study for meeting a project need. The significances of the impacts were determined through a synthesis of the criteria below:

Probability: This describes the likelihood of the impact actually occurring.

- | | |
|------------------|---|
| Improbable: | The possibility of the impact occurring is very low, due to the circumstances, design or experience. |
| Probable: | There is a probability that the impact will occur to the extent that provision must be made therefore. |
| Highly Probable: | It is most likely that the impact will occur at some stage of the development. |
| Definite: | The impact will take place regardless of any prevention plans, and there can only be relied on mitigation actions or contingency plans to contain the effect. |

Duration: The lifetime of the impact

- | | |
|--------------|---|
| Short term: | The impact will either disappear with mitigation or will be mitigated through natural processes in a time span shorter than any of the phases. |
| Medium term: | The impact will last up to the end of the phases, where after it will be negated. |
| Long term: | The impact will last for the entire operational phase of the project but will be mitigated by direct human action or by natural processes thereafter. |

Permanent: Impact that will be non-transitory. Mitigation either by man or natural processes will not occur in such a way or in such a time span that the impact can be considered transient.

Scale: The physical and spatial size of the impact

Local: The impacted area extends only as far as the activity, e.g. footprint

Site: The impact could affect the whole, or a measurable portion of the project site.

Regional: The impact could affect the area including the neighbouring residential areas.

Magnitude/Severity: Does the impact destroy the environment, or alter its function.

Low: The impact alters the affected environment in such a way that natural processes are not affected.

Medium: The affected environment is altered, but functions and processes continue in a modified way.

High: Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.

Significance: This is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required.

Negligible: The impact is non-existent or unsubstantial and is of no or little importance to any stakeholder and can be ignored.

Low: The impact is limited in extent, has low to medium intensity; whatever its probability of occurrence is, the impact will not have a material effect on the decision and is likely to require management intervention with increased costs.

Moderate: The impact is of importance to one or more stakeholders, and its intensity will be medium or high; therefore, the impact may materially affect the decision, and management intervention will be required.

High: The impact could render development options controversial or the project unacceptable if it cannot be reduced to acceptable levels; and/or the cost of management intervention will be a significant factor in mitigation.

The following weights were assigned to each attribute:

Table 5.1: Assessment of significance of environmental impacts

Aspect	Description	Weight
Probability	Improbable	1
	Probable	2
	Highly Probable	4
	Definite	5
Duration	Short term	1
	Medium term	3
	Long term	4
	Permanent	5
Scale	Local	1
	Site	2
	Regional	3
Magnitude/ Severity	Low	2
	Medium	6
	High	8
Significance	Sum (Duration, Scale, magnitude) x Probability	
	Negligible	<20
	Low	<40
	Moderate	<60
	High	>60

The significance of each activity was rated without mitigation measures and with mitigation measures for both construction, operational and decommissioning phases of the proposed.

5.4 Environmental Impacts and mitigation measures

Determination of key impacts was based on the views of interested and affected parties; legislation requirements and knowledge and understanding of the project team and environmental assessment practitioners. The impacts are classified in terms of the phase of the development in which they are likely to occur, namely the construction phase, the operational phase and the decommissioning phase (where applicable). Impact significance before and after mitigation measures was

considered. Even though some impacts are perceived to be of high severity, with appropriate mitigation measures, the probability of these impacts occurring might be low and therefore the significance of the impact is reduced.

5.4.1 Impacts of obtaining construction materials

i. Impact description

The project will require sand, ballast and quarries (for rock). Since substantial quantities of these materials will be required for construction of the facilities, the availability and sustainability of such resources at the extraction sites will be negatively affected. Quarries or any borrow pits created shall be closed so as to minimize impacts on land users and avoid the creation of safety or health hazards (e.g. steep slopes, malarial ponds). Sand mining from rivers is associated with habitat destruction due to changes in channel morphology.

ii. Significance rating

Opening up of quarries to obtain aggregates and rocks, deliveries of materials to the site have various impacts which are long term in nature. With mitigation measures, the significance of the impacts will be reduced to low.

Project phase	Impact: Impacts of obtaining construction materials						
	Activity	Probability	Duration	Scale	Magnitude/Severity	Significance	
						WOM	WM
Construction	Opening up of quarries to obtain aggregates and soil	Probable	Short term	Local	Moderate	Moderate	Low
	Health and safety issues from the quarries (Mosquitoes and drowning)	Probable	Short term	Local	Moderate	Moderate	Low

Key

WOM = Without mitigation measures.

WM = With mitigation measures

iii. Mitigation measures

(a) Borrow pits and quarries

- Maximize the re-use of excavated materials in the works, as fill.
- Selection of quarries and borrow pits sites should be done carefully so as to minimize impacts on existing land uses.
- Strip all available topsoil from borrow pits and quarries and store it safely for use in site restoration.
- Close all borrow pits and quarries in accordance with an approved plan to maximize their long-term biological productivity and minimize health and safety hazards.
- Carry out EIA for quarry site if new quarries are to be opened for purposes of this project

(b) Socially responsible procurement

- Include a provision in the tender documents that where goods and services are of equal quality, those sourced from an organization implementing a certified Environmental Management System and/or Corporate Social Responsibility approach will be preferred.

5.4.2 Generation of Wastes impacts

i. Impact description

❖ Construction Phase wastes

Solid wastes that will occur in the construction phase of the facility include;

- Domestic Solid Waste
- Excavation Waste
- Packaging Waste
- Waste Oils
- Hazardous Waste - Fuel, machinery equipment filters and wastes, chemical wastes, chemical waste or oil contaminated wastes, wasted machine parts, etc., contaminated excavation material.
- Batteries and Accumulators
- Worn out Tires

❖ Operation phase wastes

Medical waste generation from the facility is of paramount significance and should be managed according to industry standards. Among the wastes to be generated include;

- **General Waste** – from places that healthy persons live, First aid areas. Administrative offices, housekeeping, kitchen, warehouses and waste from workshops

- **Packaging Waste** – Reused recycled waste (such as paper, cardboard, paperboard, plastic, glass, metal. etc.) from all administrative offices, kitchen, warehouse, workshop
- **Medical Waste (Infectious Waste)** – Microbiological laboratory waste (Culture and inventories, infectious body fluids, serological waste and other contaminated laboratory waste. etc.). Blood products and contaminated with these objects, used surgical clothes (fabric. gown and gloves etc.). Dialysis waste (waste water and equipment), quarantine waste, air filters including bacteria and viruses, infected laboratory animal carcasses, body parts, blood and all objects that come into contact with them.
- **Pathological waste** - Anatomical waste tissues, organs and body parts and body fluids generated during surgery, autopsy, and medical interventions: - body parts, organic parts, placenta, cut limbs and so on originating from operating rooms, mortuary, autopsy, Guinea pig carcasses used in biological experiments
- **Stab Waste Hazardous Waste (Cut and drill wastes)** – Wastes that may cause abrasions and puncture wounds such as Injector needle, Scalpel, Lam-lamellae, Glass Pasteur pipette , Broken glass.etc.
- **Hazardous Chemicals** – Cytotoxic and cytostatic drugs, Amalgam waste, Genotoxic and cytotoxic waste, Pharmaceutical waste, Waste containing heavy metals, pressure vessels
- **Radioactive Waste** - Radioactive waste shall be disposed of in accordance to national legislation and international regulations.

Waste segregation should be done to ensure that mixing of wastes is avoided since this can compromise on waste management.

ii. Significance rating

Solid wastes from excavation and trenching works, construction camp and oil spills from construction vehicles and machinery will lead to short term impacts whose significance can be reduced to low with implementation of appropriate mitigation measures. Radioactive waste is high risk but with proper management and mitigation measures the impact, severity and significance will be reduced from high to medium.

Project phase	Impact: Solid Waste Impacts						
	Activity	Probability	Duration	Scale	Magnitude / Severity	Significance	
						WOM	WM
Construction	Solid waste from site offices	Probable	Short term	Local	low	Low	Low
	Soil from excavation	Probable	Short term				

	and trenching works			Local	Local	Local	Local
	Oil spills from construction vehicles	Probable (WOM)	Short term	Regional	Medium	Medium	Low
Operation phase	General/packaging waste	Definite	Long term	Local	High	Medium	Low
	Medical wastes	Definite	Long term	Regional	High	High	Medium
	Pathological wastes	Definite	Long term	Regional	High	High	Medium
	Hazardous chemicals	Definite	Long term	Regional	High	High	Medium
	Radioactive wastes	Definite	Long term	Regional	High	High	Medium

iii. Mitigation Measures

I) Construction phase

- Materials from excavation of the ground and foundation works should be reused for earthworks and landscaping. Excess soils to be disposed of at approved sites
- Domestic Solid wastes generated should be handled and disposed offsite by licensed waste handlers and according to EMCA Solid Waste Management Regulations 2006
- Institute procurement measures that recognize opportunities to return usable materials such as containers
- Waste batteries and tires should be collected for recycling by NEMA licensed waste handlers

II) Operation Phase

- Effective waste management practices that involves 3Rs (reduce, re-use, recycle) should be put in place during the construction and operation phase.
- Colour coded bins should be placed at strategic locations within the site for solid waste collection to facilitate separation and sorting
- Solid wastes generated should be handled and disposed offsite by licensed waste handlers and according to national laws governing waste management
- Biomedical wastes should be incinerated at site or disposed of by licensed waste handler

- Minimizing hazardous waste generation by implementing stringent waste segregation to prevent the commingling of non-hazardous and hazardous waste to be managed
- Train staff on the storage, management and disposal of radioactive wastes in accordance to national and international standards
- Radioactive wastes should be stored in lead box that has symbol of radioactive waste mark on it.
- Medical/contagious waste should be stored in a refrigerated storage at +4 ° C temporarily in marked containers such as red bags with infection symbol before sterilization.

5.4.3 Surface and ground water quality impacts

(i) Impact Description:

Surface and ground water quality may be impacted negatively by project activities both during construction and operation phase. These may occur through spillages from refuelling of construction vehicles, soil erosion and siltation, storm water contamination and sewer leakages, chemical spills, disposal of radioactive waste substances into the environment. The water quality impacts due to leakage or seepage may affect wells or boreholes in the vicinity of the project site, local aquifers, surface water drainages and the downstream environment.

(ii) Significance Rating

The magnitude and duration of the impacts will be medium term. The impact has a high probability of occurrence in the absence of any mitigation measures. The mitigation efficiency will however be effective in reducing the impact significance to low.

Project phase	Impact: Surface and groundwater quality						
	Activity	Probability	Duration	Scale	Magnitude/Severity	Significance	
						WOM	WM
Construction	Fuel spillage from storage and refuelling of construction vehicles	Highly Probable (WOM) Probable (WM)	Medium term	Local	Medium	Moderate	Low
	Water pollution from poor sanitation facilities	Probable	Short term	Regional	Low	Moderate	Low
	Sedimentation of drainage systems	Highly Probable (WOM)	Medium term	Regional	Medium	Moderate	Low

Operational	contamination from flood water or oil spillage from the facility	Highly Probable (WOM)	Long term	Regional	Medium	Moderate	Low
	Sewage leaks and overflows	Highly Probable	Short term	Regional	Medium	Moderate	Low

WOM = Without mitigation measures.

WM = With mitigation measures.

iii. Mitigation measures

(1) Construction Phase

Specific mitigation measures include:

- Install oil and grease interceptors at car wash areas and petrol station and service bays.
- Employ standard best practices in fuel refueling, storage and handling to prevent the risk of spillages.
- Oil spill containment and cleanup equipment should be kept at the contractor's main yard and at major construction locations, with a small kit in every project vehicle
- All such materials, fuels and chemicals must be stored in a specific and secured area to prevent pollution from spillages and leakages. The basic NEMA regulations of hazardous waste management must be applied fully.
- Construction vehicles and machines must be maintained properly (including preventive maintenance) to ensure that oil spillages are kept at a minimum.
- All drain pipes passing under building, driveway or parking should be of heavy duty PVC pipe tube encased in 150mm concrete surround
- Provide bins for construction workers at appropriate positions for disposal of litter. These bins can be colour coded to ensure minimal waste of recyclable resources.
- Sensitise and create awareness for all workers in regard to sound waste management practices.
- The location of stockpiled or excavated soil material must be done in such a way as to prevent siltation of drainage systems. The excavated and stockpiled soil material must be stored and bermed on higher lying areas of the site and not in any storm water channel or steep gradients.
- Stabilize storm water discharge points through robust designs to avoid soil erosion.

(II) Operational Phase

- (i) Proper siting of waste disposal or fuel storage areas away from storm water impacts.

- (ii) Monitoring and testing of quality of water from boreholes and nearby water sources.
- (iii) Routine monitoring of sewer pipe networks and manhole covers for leakages and overflows for immediate repair
- (iv) Avoid discharging disinfectants and cleaning agents into waste water treatment plant as it can alter the biological environment
- (v) Ensure proper treatment and monitoring of effluents before discharge to the environment or sewer system

5.4.4 Soil erosion and storm water impacts

(i) Impact Description:

A large part of the project site will be excavated to establish the foundations for putting up hospital buildings. Consequently, a huge amount of soil will be excavated and stockpiled on site. Given the site slope gradient, erosion may occur during heavy rains. The construction of buildings will increase the impervious surface areas hence increasing the amount of storm water generated at site. Eroded soils may cause clogging of drainage channels and increased storm water may cause flooding at the lower parts of the project site if not well managed.

(ii) Significance Rating

This impact has a regional extent as well as medium intensity. In the absence of the proposed mitigation measures there might be a moderate impact, with the appropriate mitigation measures the impact is reduced to low.

Project phase	Impact: Storm water Management						
	Activity	Probability	Duration	Scale	Magnitude/Severity	Significance	
						WOM	WM
Construction	Erosion of excavated and stockpiled soil	Highly Probable (WOM)	short term	Site	Medium	Moderate	Low
Operation	Increased generation of storm water from roofs and impervious surface	Highly Probable (WOM)	Long term	Regional	Medium	Moderate	Low-Negligible

iii. Mitigation measures

(1) Construction Phase

- (i) Construction activities should preferably take place during the drier season to prevent soil erosion and siltation to surface water features. This, however, also comes with dust.
- (ii) The excavated and stockpiled soil material must be stored and bermed on gently lying areas of the site and not in any storm water channel or steep gradients.
- (iii) Discharge points of all storm water channels, where flow of water is concentrated should be well and firmly stabilized.
- (iv) Surface water drainage of contaminated areas containing oil and petrol should be channelled towards a sump which will separate these chemicals and oils.

(2) Operational Phase

- (i) Storm water should be diverted away from the steep gradients as well as temporary stockpiled soil and/ or waste.
- (ii) Exposed soil should be re-vegetated or covered to prevent soil erosion. In general, landscaping areas not occupied by buildings will enhance site's aesthetic quality as well as other environmental and health impacts.
- (iii) Efficient and effective storm water management structures should be applied near all storage facilities of chemicals and hazardous material.

5.4.5 Biodiversity Impact

(i) Impact Description

The proposed project site has been in use as a military camp with mainly residential, storage and office buildings. The site does not have any indigenous trees or wild animals. There exists a few planted trees, bushes and grass covered sections which could be home to a few insects and rodents.

(ii) Significance Rating

The construction phase has a definite probability on the site leading to a moderate impact. The probability of occurrence has been rated as definite and the severity is high due to the fact that all planted trees will be cleared and grass removed. Mitigation measures would lower the significance of the activity to such an extent that it can be classified as low significance.

Project phase	Biodiversity Impact						
	Activity	Probability	Duration	Scale	Magnitude/ Severity	Significance	
						WOM	WM
Construction	Site clearance and excavation.	Definite (WOM) Definite (WM)	Permanent	Site	high	Moderate	Low

iii. Mitigation measures

(1) Construction Phase

- (i) Replant cleared areas with appropriate vegetation such grass to arrest soil erosion.
- (ii) Landscape exposed and vulnerable sites between buildings
- (iii) Adequate storm-water management must be incorporated into the design of the proposed development to prevent erosion and siltation that may impact biodiversity negatively.

5.4.6 Air Pollution

(i) Impact Description

The expected air pollutants from the proposed Project will include dust, particulate matter and gaseous emissions. Dust and particulate matter will be generated from the excavations, earth moving and materials delivery, sand, cement, gravel, murrum, etc. Smoke, hydrocarbons and nitrogenous gases will be emitted from machinery exhausts. These will be expected to increase slightly and will be localized. Air pollution is also expected to increase during the operation phase due to increased number of vehicles to the site and from the adjacent Waiyaki way. Incineration of biomedical wastes may lower air quality by releasing pollutants such as mercury and dioxins from the burning process. Odour from waste water treatment site if improperly managed may also lower the atmospheric air quality.

(ii) Significance Rating

Emission of dust from construction activities is temporary, localized and short term. Vehicular and machinery emissions are intermittent and with proper mitigation measures the impact may be reduced from high to low. Installation of the recommended incinerators, proper handling, operation and maintenance will reduce the impact on atmospheric pollution from high to low significance.

Project phase	Impact: Atmospheric pollution						
	Activity	Probability	Duration	Scale	Magnitude/Severity	Significance	
						WOM	WM
Construction	Dust emissions	Probable	Medium term (Short term)	Regional (Local)	Medium	Moderate	Low
	Exhaust emissions from vehicles & machinery	Probable	Short term	Local	Low	Low	Low
Operational	Vehicle and machinery emissions	Probable	Long term	Regional (Global)	Low	Moderate	Low
	Incinerator emissions	Highly probable	Long term	Regional	Low	Moderate	Low

iii. Mitigation measures

(1) Construction Phase

- (i) Impose speed limits (10 km/h in all areas within the site boundaries).
- (ii) Regular water sprays on access roads, stockpiles and cleared to minimize dust pollution.
- (iii) No open air burning of refuse wastes on the premises or surroundings. Refuse wastes should be removed by an official contractor and dumped at an approved site in compliance with local laws regulations.
- (iv) Proper rehabilitation of disturbed areas is required in order to minimize bare patches.
- (v) Vehicles to be used during the construction phase well serviced and maintained to prevent or minimize release of excessive fumes.
- (vi) Covering of trucks and vehicles transporting materials to prevent dust or particles from flying off the vehicles.
- (vii) For the workers who must be at the dusty locations, they should be provided with personal protective equipment (PPEs).

(2) Mitigation measures: Operational phase

- (i) Periodic measurement of stack emissions from back-up power generators to ensure they do not exceed the recommended emission limits. Air Emission Levels for Hospital Waste Incineration Facilities shall be used to determine the levels
- (ii) Ensure operator of incineration unit is adequately trained to ensure efficient operation;
- (iii) The incinerator should be operated at its design temperatures and combustion air supply;
- (iv) The laboratories should be equipped by necessary equipment and have a ventilation system that meets the standards of biosafety
- (v) All exhaust air from the laboratory should pass through high efficiency particulate air filters
- (vi) Waste should not be pre-treated with a chlorine-bearing disinfectant or should not be contained in PVC bags to avoid emission of dioxins or furans during incineration. For the same reason, no other material destined for incineration should contain chlorine-bearing chemicals.
- (vii) Prevent pollution through waste segregation before incineration and ensure removal of halogenated plastics (PVC), pressurized gas containers, large amounts of active chemical waste, silver salts and photographic / radiographic waste, waste with high heavy metal content (e.g. broken thermometers, batteries), and sealed ampoules or ampoules containing heavy metals.
- (viii) Adhere to recommended waste retention periods at the waste treatment plan to minimise odours
- (ix) Organic wastes should not be burned on the premises or surroundings.
- (x) Regular monitoring and testing of air quality at the hospital as basis for further mitigation measures

5.4.7 Noise Impact

(i) Impact Description

Noise generation will be due to construction activities, excavation equipment, concrete mixers and the transportation of equipment, materials and people. During the operation period noise will be generated from back-up generators and vehicles transporting goods, foodstuffs, pharmaceuticals, visitors and patients. With the proper mitigation measures the noise impact is not expected to be significant.

(ii) Significance Rating

The impact of increased noise is rated to be high during construction but low during operation phase. Mitigation measures are proposed to lower the significance of the impacts identified to moderate during construction or low/negligible during the operation phase. Mitigation measures must be taken in the design stage to ensure that buildings close to Waiyaki way are shielded from noise impact from the road.

Project phase	Impact: Noise						
	Activity	Probability	Duration	Scale	Magnitude/Severity	Significance	
						WOM	WM
Construction	Noise Impact associated with construction of the project	Highly Probable	Medium term	Local	Medium	Moderate	Low
Operational	Noise impact from vehicles and power generators	Probable	Long term	Local	Moderate	Moderate	Low

iii. Mitigation measures

(1) Construction Phase

- (i) Fit silencers on equipment and machinery that are expected to generate a lot of noise.
- (ii) Provide workers expected to work in noisy areas with ear muffs and enforce their use by worker through stringent supervision.
- (iii) There should be no unnecessary honking of the involved machinery and vehicles.
- (iv) Schedule road traffic movements to normal working hours (08H00 –17H00).
- (v) All equipment and vehicles on the site should be properly serviced and maintained to reduce noise.
- (vi) Work stations expected to generate a lot of noise should be shielded for instance corrugated iron sheet.

(2) Operational Phase

- (i) Proper maintenance and servicing of equipment and machinery used during the operation phase.
- (ii) Use of warning signs for speed limits, hooting and levying of engines
- (iii) Noise level measurements should be carried out on individual equipment to detect increases which could lead to increase in the noise impact over time and increased complaints.
- (iv) All activities on the site must abide by the National and International Noise Laws.

5.4.8 Traffic Impact

(i) Impact Description

Vehicles shall be used to transport construction material and equipment to site. This will have an impact on the traffic situation and may cause traffic jams in the area. There will be a slight increase in noise and in emission of exhaust fumes from construction vehicles. During the operation phase, it's anticipated that the number of vehicles to and from the hospital will increase due to increased activities at the hospital. Potential impacts include shortage of parking space at the hospital, increased air pollution and delays at the point of entry resulting from security checks to the site. A traffic impact assessment has been undertaken to guide in traffic management to the site and surrounding areas.

(ii) Significance Rating

Construction activities will result in a slight increase in traffic by heavy vehicles in the area that can result in disruptions to traffic flow, even though only for a short period. This can lead to a moderate negative impact during the construction phase with or without mitigation. The impact on traffic during the operational phases are permanent and on a local level, but it will have a low impact with appropriate mitigation measures.

Project phase	Impact: Traffic Impact						
	Activity	Probability	Duration	Scale	Magnitude/Severity	Significance	
						WOM	WM
Construction	Traffic impact caused by construction activities	Probable	Short term	Local	Medium	Moderate	Low
Operational	Increased traffic due to increased activities at the hospital	Probable	Long term	Local	Medium	Moderate	Low

iii. Mitigation measures

(1) Construction Phase

- i) Adequate and appropriate road signs should be erected to warn road users of the construction activities.
- ii) Sensitize drivers on safe driving and working practices
- iii) Avoid transporting materials during periods of peak traffic activity
- iv) Traffic should be controlled especially during material delivery mostly when large trucks are turning into the site

(II) Operational Phase

- i) Vehicles should be controlled at point of entry and departure from the hospital to avoid traffic jams at the adjacent roads
- ii) Deploy enough personnel and install equipment for use in vehicle security screening and control
- iii) Construct a service lane to accommodate vehicles awaiting for security check to the site
- iv) Follow the recommendations contained in the Traffic Impact Assessment Report

5.4.9 Health, Safety and Security impacts

(i) Impact Description

- ❖ Activities associated with construction such as excavating of trenches, movement of construction vehicles, the use of equipment and the congregation of workers and staff on site increase the risk of injury. Construction activities will also result in access of the area by vehicles delivering materials to the site that may result in accidents/incidents. Work at the proposed site may involve **hazards such as accidental falls into open trenches, slippery walkways, working at heights, exposure to energized circuits, and heavy equipment.** Work at the project site may also involve entry into confined spaces, including manholes and storage tanks among others.
- ❖ There may also be unhealthy interactions between male project workers and local women. These may lead to unsafe sex and exposure to sexually transmitted infections including HIV/AIDS.
- ❖ Increased number of workforce during construction provides opportunity for **criminals** to infiltrate the site hence causing potential **security risks.**
- ❖ **Fire hazards** – this may result from poor handling and storage of inflammable substances at the hospital during construction and operation phase.
- ❖ **Spread of Disease Covid 19** – there is the possibility of the spread of infectious diseases such as COVID-19 as a result of failure to adhere to prevention measures at the work site and other project areas. Possible infection routes include: contact with infected masks and gloves, weak compliance with the precaution measures for infection prevention and control on COVID-19 including hand washing hygiene, respiratory/cough antiques, and lack of established procedure for disposal of used PPE, among others

(ii) Significance Rating

Most health and safety impacts during construction phase will be onsite and will be short term in nature. However, a few others may affect the larger community. These may include accidents from vehicles delivering material to site and other construction site activities with potential of causing injuries to residents. The impact will be short term in nature with moderate significance which

can be turned into low with implementation of appropriate mitigation measures. Risks such as fire out breaks, Covid 19 infection and spread, accidents and site security will be long term in nature, have a high magnitude but with mitigation measures the impacts will be low.

Project phase	Impact: Safety, health and fire hazards						
	Activity	Probability	Duration	Scale	Magnitude/Severity	Significance	
						WOM	WM
Construction	Increased risk of accidents from construction activities	Highly Probable (WOM) Probable (WM)	Medium term	Site	High (WOM) Medium (WM)	Moderate	Low
Operational	Risk of accidents during operation phase	Highly Probable	Long term	Site	High (WOM) Medium (WM)	Moderate	Low
Construction and operation	Fire hazards	Highly Probable	Long Term	Local	High	Moderate	Low
	Infiltration of criminals into the hospital	Probable	Long Term	local	High	Moderate	Low
	Covid 19 infections and spread	Highly Probable	Long Term	Regional	High	High	Medium

iii. Mitigation measures

(1) Construction and operational Phases

- (i) The Contractor shall conform to all the stipulations of the Occupational Health and Safety Act, 2007. The Act requires the designation of a Health and Safety representative when more than 20 employees are deployed.
- (ii) The contractor shall provide ample warning signs, guard rails, warning tape, etc., around open excavations, stacks of material, debris, etc. and shall be held liable for all claims as a result of neglect of such precautions and provisions.
- (iii) Proper access control should be enforced to ensure that no unauthorised persons enter the site.
- (iv) Construction vehicles should be under the control of competent personnel. Ensure that persons handling equipment and materials are suitably trained, supervised and adequately instructed.

Establish and enforce a strict code of conduct for all project drivers including outside suppliers delivering materials

- (v) Establish and implement an HIV/AIDS prevention programme specifically related to the project's construction phase. The programme should include those at high risk of engaging in unsafe sex conduct such as truck drivers and bar workers
- (vi) The construction sites should be properly fenced and guarded with controlled exit and entry points
- (vii) Employees should be properly vetted and supervised to weed out any criminal agents within the work force
- (viii) Train all contractors' workers on the signs and symptoms of COVID-19, how it spreads, how to protect themselves and the need to be tested if they have symptoms
- (ix) Mandatory provision and use of appropriate Personal Protective Equipment (PPE) and Social distancing among all project personnel and visitors
- (x) Provide hand wash facilities, water and soap, alcohol-based hand sanitizer and mandate their use on entry and exit of the project site
- (xi) Encourage Covid 19 Vaccination among workers and project personnel

(II) Operational phase

- (i) Ensure that the contact details of the fire brigade and ambulance services are available on site
- (ii) Use of detection and alarm systems including communication and public address systems to detect a fire and alert the building staff, emergency response teams, occupants and other fire response units.
- (iii) Use of automatic and manual fire suppression and control equipment, such as automatic sprinkler systems, manual portable extinguishers, and fire hose reels.
- (iv) Formulate an Emergency Response Plan for the hospital to assist staff and emergency response teams during fire emergency.
- (v) Regular servicing and testing of fire-fighting equipment and facilities to ensure they function properly at all times and as required by law.

5.4.10 Visual Impact

(i) Impact Description

Major and minor earthworks will take place to ensure site preparation; which will entail the removal of the existing buildings, trees, soil cover and the subsequent exposure of the soil. Material stockpiles, material sheds and construction equipment will be present on site, which could give the site a disordered feel. During the operation period the site will be completely modified and will consist of several multi storey buildings. Therefore the landscape will be permanently and

irreversibly altered. Upon the completion of the construction work the site will be cleaned and disturbed areas landscaped.

(i) Significance Rating

The project site is fenced by masonry wall fence thereby minimizing visual impact to surrounding residents living adjacent to the site. However, as the tall buildings emerge visual changes will be noticeable. The visual intrusion is considered to be moderate but permanent and irreversible.

Project phase	Landscape Impacts						
	Activity	Probability	Duration	Scale	Magnitude/Severity	Significance	
						WOM	WM
Construction	Removal of vegetation & buildings within the project area	Definite	Permanent	Site	Medium	Medium	Low
	Impact of presence of unsightly views of construction activities.	Highly probable	Short Term	site	Low	Low	Low
Operational	Altering the visual character of the site due to introduction of new buildings	Probable	Permanent	Local	Low	Low	Low

iii. Mitigation measures

(I) Construction Phase

- Keep the construction sites and camps neat, clean and organised in order to portray a tidy appearance.
- Rehabilitate or vegetate disturbed areas as soon as practically possible after construction. This should be done to restrict long stages of exposed soil and possible erosion that will result in indirect landscape and visual impacts.

(2) Operational Phase

- Maintain the landscape to a high aesthetic standard to retain a high visual quality for patients, visitors and workers.

5.4.11 Increased Water Demand

(i) Impact Description

There will be an increased water demand due to increased construction activities. Water will be used for drinking, in the washrooms for workers and staff, dust suppression and in the mixing and making of concrete. During the operation phase a lot of water will be needed for washing and cleaning purposes, preparation of meals and in discharge of effluent wastes. The increased water-use may affect water supply in the area if alternative sources of water are not sought.

(ii) Significance Rating

The impact of increased water use at the site will be permanent and can be mitigated to lower its significance.

Project phase	Impact: Increased Water Demand						
	Activity	Probability	Duration	Scale	Magnitude/Severity	Significance	
						WOM	WM
Construction phase	workers and Construction activities	Definite	Short term	Local	moderate	High	Low
Operation phase	Operation activities	Definite	Long Term	Local	moderate	Medium	Low

iii. Mitigation measures

(1) Construction Phase

The following mitigation measures should be taken in advance:

- The proponent shall ensure that water is used efficiently at the site by sensitizing construction staff to avoid irresponsible water use.
- Install water conserving automatic taps and toilets.
- Fix any water leaks from damaged pipes and faulty taps
- Apply for water abstraction permit as required under the Water Act, 2016

(II) Operation phase

- Install water conserving automatic taps and toilets.
- Ensure that any water leaks through damaged pipes and faulty taps shall be fixed promptly by qualified staff.
- Consider rain water harvesting to have alternative water supply

5.4.12 Increased demand on Energy

(i) Impact Description

There will be increased energy demand during the construction phase of the project that will be met by via electricity distribution network of the KPLC. Stand by power generators will be used in case of electric outages. Some construction machines and equipment will use fuel to run. On completion, the project shall consume large amount of electricity for lighting due to the high number electric appliances required. This will include cooling system for short life products. Liquefied Petroleum Gas (LPG) will be used in some instances.

(ii) Significance Rating

This impact will definitely occur and can be described as moderate. Adoption of alternative sources of energy such as solar power will reduce the impact significance to low.

Project phase	Impact: Increased energy demand						
	Activity	Probability	Duration	Scale	Magnitude/Severity	Significance	
						WOM	WM
Construction	Electric power and fuel for construction	Definite	Medium term	local	Medium	Medium	Low
	Electricity, LPG and fuel for operation phase	Definite	Long term	Local	Medium	Medium	Low

WOM = Without mitigation measures. WM = With mitigation measures

iii. Mitigation measures

(1) Construction and Operation Phase

- Employ the use of energy saving bulbs at the premises;
- Install security lights with sensors to save on energy during the night
- Switch off all electrical equipment when not in use to save energy

- Install alternative energy sources such as solar power to assist in lighting and warming of bath water
- Monitor and keep records of energy use. Undertake yearly energy audits on all types of energy usage in the facility for better decision making on energy conservation

5.4.13 Social and Labour Issues

The proponent (KDF) and the contractor will fulfill the requirements of IFC PS2: Labor and Working Conditions by adopting and implementing the requirements of the Kenya Employment Act 2007, the Occupational Health and Safety Act of 2007, the Building Code 2015 and the Work Injury Compensation Benefit Act 2007 and other legislation. The proponent and contractor already have in place a Human Resource (HR) Policy guided by the legislation and appropriate to the size of the anticipated workforce. **A Labour Management Plan (LMP)** has been prepared to guide on worker social and labour issues and has been attached to this report.

HR policy shall address all employment issues such as child labour, forced labour, workers engaged by third parties, gender and discrimination, occupational health and the supply chain. The aforementioned legislation further stipulates the working conditions under workers should work under. Subcontractors will also be required to follow the requirements of PS2 and contracts to be signed with subcontractors will include EHS requirements.

The project will have a four category of workers as defined by the Environmental and Social Standard -2 of the World Bank. They include (i) direct employees from the ministry and all consultants (ii) primary suppliers of materials such as sand, cement, timber etc and local community workers who will be engaged as casuals in the construction process as masons, plumbers, electricians, cleaners among other canters of employment.

This Labor Management Plan proposes two layer Grievance Redress Mechanism, one to address general aspects of grievances and a second layer to address grievances related to Sexual Exploitation and Abuse, (SEA), Gender based Violence (GBV) and Sexual harassment (SH).The consultant has described the action to be taken to ensure total compliance with the ESMP and the LMP and provided a list of commitments for the project implementers by which this LMP will be implemented.

5.4.14 Indigenous Peoples

There are no indigenous peoples on the proposed project site. The project site is the property of the Government of Kenya that has been in use as a military camp. There is no record suggesting that the piece of land belonged to indigenous people.

5.4.15 Cultural Heritage

According to IFC Performance Standard PS8, cultural heritage refers to includes tangible forms of cultural heritage, such as tangible moveable or immovable objects, property, sites, structures, or groups of structures, having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values; unique natural features or tangible objects that embody cultural values, such as sacred groves, rocks, lakes, and waterfalls; and certain instances of intangible forms of culture that are proposed to be used for commercial purposes, such as cultural knowledge, innovations, and practices of communities embodying traditional lifestyles. With this definition in mind, the site does not have any forms of cultural heritage and has been under use as a military camp.

5.5 Environmental Impacts and Mitigation measures for associated facilities

In this section a number of facilities that are associated with the construction and operation of the hospital have been discussed. These facilities include Waste Water Treatment Plant (WWTP), Incinerator, Concrete Batching Plant and Mortuary.

5.5.1 Waste Water Treatment Plant

5.5.1.1 Introduction

The proponent intends to construct a Waste Water Treatment Plant (WWTP) that will be designed according to the quality (Chemical, physical and bacteriological characteristics) and quantity of waste water to be treated per day, method of treatment to be used, sludge quantity and quality and method of sludge treatment and disposal.

The WWTP shall be constructed according to the design and site layout plan and guided and supervised by the contractor's consultant civil & structural engineers. It is proposed that treated waste water will be discharged into the public sewer system.

The construction and operation of the WWTP shall comply to the existing national guidelines and legislation including the EMC (Water Quality) Regulations 2006, EMC (Waste Management) Regulations 2006, Public Health Act Cap 242 Laws of Kenya, Occupational Safety and Health Act (OSHA) 2007, Excessive Noise Pollution and Vibration Control Regulations 2009, EMC (Air Quality) Regulations 2014 ((Refer to Chapter 4 of the ESIA Report).)

5.5.1.2 Potential Environmental Impacts Associated with WWTPs

i) Noise and dust emissions

Noise, dust emissions and solid waste impacts have been dealt with under the Construction EMP (Refer to CEMP)

ii) Infiltration to soils, groundwater and water supply

The provision of proper wastewater treatment facilities will reduce or eliminate any significant potential for infiltration of sewage into the soil, groundwater and surface water resources.

iii) Odours and air pollution

During operation phase, the waste water treatment plant may lead to the deterioration of local air quality if not managed according to standard operating procedures. Odours in collection systems result principally from hydrogen sulphide gas and other reduced-sulphur compounds produced by anaerobic sulphate-reducing bacteria in sludge deposits and slime layers. Preventing or limiting the source conditions that allow the bacteria to grow will reduce the odours

iv) Exposure to Chemical Hazards

The process of waste water treatment involves the measurement, mixing and application of chemicals. These may pose the risk of contamination and inhalation by WWTP operators. However, with the strict adherence and observance of safety and health rules, this impact is negligible.

v) Physical Hazards and Safety

The WWTP should be properly secured and protected to avoid falls and injuries from careless activities around the plant.

5.5.1.3 Mitigation measures for construction and operation of WWTP

I) Construction phase

- Refer to mitigation measures in the general construction EMP (Table 6.1)
- Construct WWTP with high quality materials and in accordance to the design engineer's standards to prevent leakages.

II) Operation Phase

- Maintaining proper operations and maintenance practices such as sewer inspections and management to avoid odours
- Minimize hydraulic detention times in pipes and wet wells
- Cover emission points (e.g., manholes)

- Clear and unclog blocked wastewater/sewer lines within the shortest time possible to contain sewage spills and overflows
- Train WWTP operators in safe handling of waste water treatment chemicals and emergency response procedures
- Provide appropriate personal protective equipment for use by WWTP workers
- Install safety showers and eye wash stations near areas where hazardous chemicals are stored or used
- Erect perimeter fence around waste water treatment plant to restrict access and prevent physical injuries
- Post security guards to secure the site.
- Provide emergency rescue facilities such rescue buoys and throw bags and train workers on how to use them in case of an emergency
- Provide adequate security lighting around the WWTP
- Sludge from the WWTP shall be removed once every 2-3 years
- Test and determine quality of sludge to guide disposal

5.5.2 Medical Waste Incinerator

5.5.2.1 Introduction

An incinerator with specifications of handling the expected Volume of clinical waste shall be installed at site to manage waste from the proposed health facility. The proponent is in the process of sourcing and purchasing an appropriate incinerator for the proposed hospital. EMCA 2006 (waste management) Regulations classifies incinerators and the most appropriate for the disposal of waste that contains hazardous, potential hazardous and bio-medical waste where the operator exceeds 100 Kg/day is classified under Class 2A (Commercial Incinerators). These regulations stipulate the standards, guidelines, criteria, procedure for installing/operating incinerators.

Incinerators use high temperature (200°C to 1000°C), dry oxidation process that reduces organic and combustible waste to inorganic, incombustible matter, resulting in a significant decrease in overall waste volume. Organic matter is chemically and physically broken down mainly through the process of combustion.

Some wastes must be treated before incineration and these include:

- Pressurized gas containers
- Large amounts of reactive chemical wastes
- Silver salts and photographic or radiographic wastes
- Halogenated materials (such as PVC plastics)

- Waste containing mercury, cadmium, and other heavy metals
- Sealed ampoules or vials that might implode during combustion
- Radioactive materials
- Pharmaceuticals that are thermally stable in conditions below 1200°

The proposed waste incinerator shall be constructed and operated in compliance to the existing national guidelines and legislation including the EMC (Air Quality) Regulations 2014, EMC (Water Quality) Regulations 2006, EMC (Waste Management) Regulations 2006, Public Health Act Cap 242 Laws of Kenya, Occupational Safety and Health Act (OSHA) 2007 among others (Refer to Chapter 4 of the ESIA Report).

5.5.2.2 Environmental, health and safety Risks associated with Waste Incinerators

The main EHS risks emanate from the emission of hazardous pollutants and disposal of ash from incinerators. Poor management of waste, incinerator operations and poor maintenance may lead to excess emissions of the following pollutants:

- Trace metals: As, Cd, Cr, Cu, Hg, Mg, Ni, Pb
- Acid gases: HCl, SO₂, NO_x
- Dioxins and furans, including 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)
- Other organic compounds: benzene, carbon tetrachloride, chlorophenols, trichloroethylene, toluene, xylenes, trichlorotrifluoroethane, polycyclic aromatic hydrocarbons, vinyl chloride, etc.
- Carbon monoxide
- Particulate matter
- Pathogens (from incinerators with poor combustion)
- Bottom Ash generally contains - dioxins/furans, other organics, leachable metals

Dioxins are carcinogenic and are mostly associated with causing various cancers, birth defects, and suppression of immune systems in human beings.

5.5.2.3 Mitigation Measures for construction and Operation Phase

I) Construction Phase

Refer to CEMP for mitigation measures

II) Operation Phase

- Cleaning of the combustion chamber and de-clogging of air flows and fuel burners should be done as scheduled.
- Routine inspections of the furnace and air pollution control systems should be undertaken
- Monitoring of incinerator emissions should be undertaken and should comply with national standards and or in accordance to the Stockholm convention on persistent Organic Pollutants
- Ash should be handled, transported (using covered hauling) and disposed of in an environmentally friendly manner
- Disposal should be done in safe dedicated landfills (e.g., landfilling in double-walled containers, solidification, or thermal post-treatment)
- The incinerator should be operated by well trained and qualified personnel
- Undertake bi-annual medication tests for incinerator operators
- Provide adequate personal protection equipment (PPEs) such as Gloves, Boots, Overalls, Aprons, goggles, mouth respirators, helmets
- Do not allow unauthorized persons to enter the incinerator area during periods of incineration

5.5.3 Batching Plant

5.5.3.1 Introduction

The project contractor “China Wu Yi” has installed a batching plant on site to manufacture concrete for the construction of the proposed buildings/structures. The batching plant is temporal and shall be decommissioned upon completion of the construction activities.

Concrete batching consists of producing concrete or concrete products by mixing cement with fine aggregate (sand), coarse aggregate (crushed rock or gravel) and water. Cement may be substituted in part by supplementary cementitious materials (SCMs) such as fly ash, slag or silica fume. Small quantities of admixture chemicals may also be added to the concrete to impart special properties such as longer or shorter setting times, increased early strength or more flowable concrete.

The batching has already been set up and the contractor shall be obliged to comply to the existing national guidelines and legislation including the EMC (Air Quality) Regulations 2014, EMC (Water Quality) Regulations 2006, EMC (Waste Management) Regulations 2006, Public Health Act Cap 242 Laws of Kenya, Occupational Safety and Health Act (OSHA) 2007 among others (Refer to Chapter 4 of the ESIA Report).

5.5.3.2 Environmental Risks Associated with the operation of Batching Plants

i) Excessive Dust Emissions

Dust is normally generated from the delivery, storage and transfer of cement, sand and gravel, truck movements and the concrete batching process.

ii) Excessive Noise

Noise at a plant can be generated from activities such as the delivery of cement, sand and gravel, handling, loading and mixing of concrete, truck movements or reversing beepers, the running of machinery such as pumps, conveyor belts, compressors and motors, de-dagging of agitator bowls

iii) Polluted Wastewater

Wastewater from plants may contain potential pollutants such as cement and aggregates that can increase the turbidity of local waterways and cement contaminated water can also be highly alkaline. Inappropriate storage and handling of chemicals/fuels onsite can also lead to polluted surface and ground waters.

iv) Inappropriate disposal of waste

Unused wet waste concrete, waste oil, chemicals, contaminated water or other admixtures such as bagged oxide and silica should not be disposed of down storm water drains or dumped on land.

5.5.3.3 Mitigation Measures for batching Plant

I) Construction Phase

Refer to CEMP for construction mitigation measures

II) Operation Phase Mitigation Measures

- Transport sand and aggregate in trucks with enclosed top covers
- Transport damp sand and aggregate or wet on receipt, to avoid dust dispersal during unloading
- Transport cement and SCM in fully enclosed containment system
- Store sand & aggregates at bays enclosed on three sides by solid walls
- Install additional screening over and above wall height of the bays as required (e.g. shade cloth)
- Ensure bays are fitted with functional, well-maintained, effective sprinkler systems to suppress dust
- Bays - stockpiles kept at least 0.5 m below the top of walls and 0.5m inside open end of bays
- Post signage “Do not overfill” the bays instructing staff
- Install emergency pressure alert/overflow protection systems
- Fit the batching plant with high quality dust filters
- All pumps and electric motors should be enclosed

- All compressors enclosed, where it is safe to do so without causing over heating
- All pressure-operated equipment and engines should be fitted with silencing/muffling devices
- Use of sound-absorbing materials (at point source)
- Install sound-barriers and buffers between plant and other facilities
- Regular good practice maintenance of all equipment, heavy machinery and trucks and maintenance records kept
- All process water from concrete manufacture should be recycled back into production via a fully integrated system including, collection, reclamation, capacity storage, and re-use
- Process water recycling system should be fully isolated from storm water drains
- Construct storage tank to store reclaimed process water that can contain first flush, contaminated water capture following rain events
- Store chemicals and fuel in a roofed impervious solid walled bunded area
- Construct chemical storage area away from storm water or recycled water or rain entry
- Avail Chemical spill kits on site that can be easily accessed and trained staff in their use
- Secure the batching plant from unauthorized access

5.5.4 Mortuary

5.5.4.1 Introduction

The proposed Hospital Mortuary shall provide a facility for autopsy, embalming, storage, viewing and/or identification and casketing of bodies. A storage capacity of 60 bodies shall be provided for regular use with an additional disaster contingency of 40 bodies. The acceptable average temperature within a normal body cabinet or refrigerated room shall be maintained between 2.0°C and 6.0°C. Separate body cabinets shall be provided for long-term storage of bodies at a lower temperature (-20°C) than would be the case in a refrigerated room.

The Hospital Mortuary Unit shall consist of the following Functional Areas:

- a) Reception area.
- b) Toilets for staff and visitors.
- c) Visitors' admin space close to the reception area, where any admin or official business related to the identifying of a body can be completed.
- d) Staff admin space close to the point where a body is delivered to the mortuary, so that pertinent documentation can be completed.
- e) Office space for pathologists and other staff.
- f) Meeting room.
- g) Teaching rooms and amenities.
- h) Waiting and circulation areas for visitors to the mortuary.
- i) Viewing rooms.
- j) Prayer Room

- k) Body-display room, where a body is placed for identification purposes. Access to this area from the bodystorage area shall be provided.
- l) Body preparation area.
- m) Staff Changing room with toilet and shower facilities (separate M/F)
- n) Storage space for equipment and clothing that is worn in the body-preparation and autopsy spaces.
- o) Body-storage facility.
- p) Autopsy facility.
- q) Storage space for body lifts.
- r) Sluicing facilities.
- s) A temperature gauge with an alarm activated at a point that is manned at all times.
- t) Uninterruptable power supply installed to body cabinets and refrigerated rooms.
- u) A well-drained facility for washing vehicles, which have been contaminated with decomposed bodies or body fluids.
- v) Hot and cold water in the basins, sinks, ablution areas and autopsy.
- w) Staff and Visitors Parking

The proposed mortuary shall be constructed and operated in compliance to the existing national guidelines and legislation including the EMC (Air Quality) Regulations 2014, EMC (Water Quality) Regulations 2006, EMC (Waste Management) Regulations 2006, Public Health Act Cap 242 Laws of Kenya, Occupational Safety and Health Act (OSHA) 2007, Sustainable Waste Management Act 2021 (Refer to Chapter 4 of the ESIA Report).

5.5.4.2 Environmental, health and safety risks associated with mortuary

i) Air quality

Air quality at the mortuary may be compromised by inappropriate storage of bodies, poor ventilation or malfunctioning refrigeration system.

ii) Generation of wastes

These include general waste from offices and biomedical wastes from the autopsy rooms. Mitigation measures for wastes during construction phase have been covered under the CEMP.

iii) Occupational Health and safety risks

Occupational Health and Safety risks may arise from improper handling of infected materials such sharps, foul smell from improperly kept bodies, injuries and infections. Other risks may arise from congestion or crowding when viewing bodies that may expose visitors to Covid 19 disease.

v) High energy demand

There will be increased energy demand at the facility resulting from the refrigeration of bodies. The hospital envisages keeping a maximum of about 100 bodies at the mortuary. This requires varying degrees of refrigeration temperatures to ensure the bodies and or body parts do not rot.

5.5.4.3 Mitigations Measures

I) Construction mitigation measures

Waste generation, Noise and Air pollution, OHS impacts for the construction period refer to the Construction EMP for mitigation measures

II) Operation mitigation Measures

- Install automatic temperature monitors with alarm to alert in-case of refrigeration system failure.
- Embalm all bodies before storage in order to prevent them from rotting
- The exhaust air shall be discharged to atmosphere such that it cannot be drawn back into the mortuary, any other ventilation inlet, or any indoor portion of the hospital
- Dispose wastes regularly and appropriately to prevent wastes from decomposing at collection areas
- Provide all workers in areas where air quality is compromised with appropriate PPEs
- Air extracted from the mortuary shall not be used for energy recovery or recirculation
- Provide adequate bins for general waste collection
- Sort and segregate waste before storage, treatment and disposal
- Biomedical wastes should be disposed of as outlined in the operation phase EMP
- Provide facilities for refrigeration of certain types of wastes before disposal
- Vehicles that have been contaminated with decomposed bodies or body fluids shall be washed in special area and discharge channelled to WWTP.
- Train personnel handling infectious wastes on safety and proper management twice a year
- Provide all workers handling wastes with appropriate PPE to reduce accidental injuries and infections
- Sharps should not be re-used
- Use proper method for sterilization of equipment at autopsy rooms
- Store biomedical wastes in special containers designed for storing such wastes
- All external ventilation openings shall be fly and vermin-proof
- Keep first Aid Kits at the mortuary in-case of injury
- Use energy saving bulbs and Install alternative sources of energy such as solar power for lighting
- Switch off lights when not in use

CHAPTER 6

6. ENVIRONMENTAL AND SOCIAL IMPACT MANAGEMENT

6.1 Introduction

6.1.1 General

The key outcome of the Environmental and Social Impact Assessment (ESIA) process for the proposed construction of the KFRRH project is the Environmental and Social Management Plan (ESMP). In real meaning, the ESMP is a mechanism to meet the recommended environmental and social mitigation measures. This ESMP is an instrument that will allow KDF, Contractor, visitors and other key stakeholders to integrate environmental and social components into the project during implementation, operation and decommissioning phases.

The ESIA is a complex document containing a series of recommendations related to mitigation measures, monitoring and management. A key role of the ESMP is to put them all in a single framework showing mitigation measures, responsibilities, and timelines for implementation. It also highlights the various commitments that must be made at various levels, from the senior management level of KDF to the levels of all parties involved in the implementation of the project.

6.1.2 Scope and Objectives of the ESMP

This Environmental and Social Management Plan focuses on mitigating the impacts identified during the environmental and social assessment. It is an instrument that will allow KDF, Contractor and other key stakeholders to integrate environmental and social concerns into the project during the various phases. This plan is meant to establish measures and procedures to control the analyzed impacts and monitor their progress. It will achieve the following in the long run:

- (i) Provide the National Environment Management Authority (NEMA) with a tool to make ease the evaluation of the objectives at different phases of the project, taking into account the Kenyan environmental legislation;
- (ii) Provide clear and mandatory instructions to the proponent, contractor users and other key stakeholders with regard to their environmental and social responsibilities in all phases of project.
- (iii) Ensure continuous compliance of KDF, contractor and other key stakeholders with Kenyan legislation and policies regarding the environment;

(iv) Assure the regulators and interested and affected parties the satisfaction of their demands in relation to environmental and social performance.

6.1.3 Applicable Legislation

The pieces of legislation applicable to the ESMP are described in Chapter four of this project report. International normative instruments concerning the environment, as well as international best practices have also been considered.

6.2 Environmental Awareness

The proponent will be sensitive to the needs of the environment so as not to degrade the existing environmental conditions. It is the proponent's primary responsibility to ensure that all parties are directly involved in the construction and operation phases of the project, including making managers and employees aware about the need to prevent or minimize environmental and social impacts. The awareness activities should be guided by the following issues:

- (i) Prevention of pollution of surface water and groundwater;
- (ii) Prevention of air quality degradation;
- (iii) Minimization of increased noise levels;
- (iv) Relocation and compensation of project affected persons
- (v) Prevention/reduction of social and economic disruptions;
- (vi) Prevention of risks to health and safety of workers and the general public.

6.3 Mitigation

All activities related to the lifecycle of the project will be subjected to appropriate mitigation measures to ensure that negative impacts are properly mitigated and managed. Mitigation involves identifying the best options to be adopted to minimize or eliminate negative impacts, highlighting the benefits associated with the proposed project and the protection of public and individual rights. Practical measures are therefore sought to reduce adverse impacts or enhance beneficial impacts of the project.

6.4 Responsibilities in Environmental and Social Management

6.4.1 General

Kenya Defense Force and the contractor are the main entities responsible for implementing this ESMP. In the interest of environmental protection, health and safety of workers and the public, and in their own interest, the proponent should include in their contractual arrangements with contractors, clauses relating to environmental protection -and, specifically, compliance with the

ESMP - that will safeguard the right to require the contractor's compliance with environmental requirements and social action in case of breach.

6.4.2 Responsibility of KDF

The proponent (KDF) will ensure that all project operations are conducted in accordance with their internal environmental policies and in accordance with the ESMP. KDF in partnership with the contractor and other key stakeholders will ensure that the ESMP and other requirements related to health, safety and environment are implemented in full. KDF should strive to manage operations in a manner to protect the environment and health and safety of employees, contractors, consumers and the general public. To achieve this objective, KDF will:

- (i) Obtain Authorizations/Approvals/Licenses required for project implementation;
- (ii) Request the contractor to operate on the basis of valid Authorizations/approvals/ licenses for the activities to be implemented;
- (iii) Ensure that the EMP is an integral part of the contract document with the Contractor and that the contractor will be responsible for its implementation;
- (iv) Establish institutional linkages with relevant parties in the project implementation as needed, or designate a representative for that purpose;
- (v) Ensure that the various project activities comply with the mitigation measures proposed in the Environmental Management and Monitoring Program (ESMP);
- (vi) Ensure that there are contingency plans and resources for employees health and contingency plans to respond to accidents at work (Emergency Response Plan);
- (vii) Make regular inspections to all the different activities with regard to social aspects, health, safety and environment and check for any non-conformity with the EMP attributable to the Contractor and identify the steps taken for its correction;
- (viii) Produce reports that allow to monitor and evaluate the performance of operations following the measures and objectives of the ESIA and ESMP in relation to health, safety and environmental protection;
- (ix) Conduct an initial induction for construction activities with contractors before the commencement of operations;
- (x) Monitor the performance of their own teams, or designate a representative to that effect;
- (xi) Approve work procedures established for each phase of the project and ensure that the various proposed activities are implemented in accordance with them;
- (xii) Establish and implement a complaints management procedure that allows treatment/appropriate response to them;
- (xiii) Create awareness among workers about environment, health and safety issues; and
- (xiv) Ensure that any corrective activities recommended by the audits or inspections (performed internally or externally) are implemented within the time pre-set.

If the activities of this project are awarded to contractors or subcontractors to act on behalf of the proponent, the responsibilities indicated here as of the proponent's move to these companies. From an environmental point of view, the primary responsibility over the continued operations, belong to the proponent. It is recommended therefore that where there are jobs awarded to contractors, be appointed a Clerk of Work/Supervisor, which will verify its performance.

6.4.3 Responsibility of the Contractor

All Contractors should identify individuals responsible for overall management of the environment, social management, safety and health management during all operations. The Contractor shall be responsible for relevant training of its staff, which must be able to complete the project activities in an efficient and appropriate manner in accordance with the contractual requirements of KDF to the agreed work. Among many tasks, the contractor shall:

- (i) Prepare its own EMP as well as a health and safety plan within 30 days of signing of the contract. The EMP implementation plan must be approved by KDF prior to the initiation of construction works;
- (ii) Submit to the proponent the work procedures/methods or equivalent documents for approval;
- (iii) Operate on the basis of valid Licenses/Approvals/Authorizations for the activities to be implemented;
- (iv) Employ techniques, practices and construction methods to ensure compliance with the ESMP;
- (v) Prevent or minimize the occurrence of accidents which might cause damage to the environment and be able to respond positively to an accident if it occurs;
- (vi) Meet the working procedures and environmental requirements and health and safety established by contract with the Proponent; ensure compliance with them by sub-contractors who might be hired by him;
- (vii) Minimize environmental damage, waste control, avoid pollution, prevent loss or damage on natural resources and minimize the effects on the users and occupants of surrounding lands and the public;
- (viii) Provide Personal Protective Equipment (PPE) to workers which is appropriate to the tasks to be performed and ensure that it is used;

- (ix) Implement all corrective activities agreed in audit (internal or performed by other agencies) or inspections, within the pre- established deadline;
- (x) Manage the complaints process on the elements that fall within its jurisdiction, or refer complaints to the Proponent, so that they can receive treatment/appropriate response;
- (xi) Prepare a Rehabilitation Plan which shall include preliminary designs on the temporary and permanent landscaping plan during both the construction and post-construction and maintenance period (where applicable).

6.4.4 Responsibilities of Regulatory Agencies

Regulatory Agencies directly involved in this project include the National Environment Management Authority (NEMA), County Labour Officers, KPLC, Nairobi Water and Sewerage Company, Kenya Urban Roads Authority (KURA), Radiation Protection Agency among others. NEMA is the institution that plays a greater role in the process since it is responsible for taking decision on the ESIA process and responsible for regulating the environmental performance of projects in Kenya. They are also responsible for verification, inspection and audit, before, during and after the implementation of projects (in accordance with EMCA 1999). NEMA is also a governmental agency with expertise in waste management with regard to: the issuance and dissemination of the mandatory rules on the procedures to be followed for waste management ; carry out the environmental licensing of facilities or storage sites and/or disposal of hazardous waste; accredit operators of hazardous waste transportation and vehicles used to transport ; register the public or private entities that handle hazardous waste, and adopt, in coordination with the sectors in charge, the necessary measures to suspend the storage, disposal or transportation of hazardous waste illegally made and/or in conditions that are a danger to public health or the environment.

The other institutions listed above play a subsidiary role in specific issues of the ESIA process and its implementation. For instance KPLC and Nairobi Water and Sewerage Company shall be responsible for power and water connection to the site. Whilst KURA and KDF will work together on the establishment of service lane to the construction site.

6.4.5 Responsibility of the Environment, Health and Safety Supervisor (EHSS)

KDF shall appoint an Environmental, Health and Safety Supervisor who shall be working on the construction site to oversee the contractor's compliance of the ESMP. The EHSS will be responsible for monitoring of all activities related to the execution of work (development and operation of construction sites, service fronts, borrow pit areas) and all construction activities, participating in the receipt of approval of services, checking compliance with project specifications and standards of service, in addition to any requirements that may be made by the environmental

licensing authority. The EHSS shall report directly to the Resident Engineer. Activities to be undertaken by the supervisor include:

- (i) Evaluation of the implementation strategy of the proposed works, and of the final execution planning proposed by the contractor in the Work Implementation Plan;
- (ii) Permanent monitoring of construction activities, integrated with the technical supervision of works, checking compliance with the mitigation measures of impact and/or environmental and social control, contributing to the proper routing of unforeseen situations and for the rapid solution of non-compliances;
- (iii) Permanent and rigorous verification of the occurrence of impacts to the surrounding communities and users of space covered by construction activities;
- (iv) Preparation of regular monitoring reports indicating non-compliances and environmental disputes to be resolved by the contractor;
- (v) Participation in the verification and approval of the services measurement in what concerns the conservation of the environment and health and safety of workers and communities surrounding the project;
- (vi) Monitor the environmental and safety impacts of current activities, continuous review of the update of the proposed measures for mitigation activities and related impacts of the proposed work. This will be formulated in terms of, and considering the standards and specifications to mitigate environmental impact;
- (vii) Develop procedures and technical tools for monitoring and supervising environmental and social works;
- (viii) Develop procedures and technical tools for the management and monitoring social and environmental programs;
- (ix) Installation of the database that will collect information and records of supervisory activities and environmental management of the project;
- (x) Comply with and enforce existing laws and the requirements of environmental agencies and other relevant bodies involved;
- (xi) Ensure that the Environmental Management Plan is fulfilled according to the stipulated standards;

- (xii) Identify and evaluate periodically the effects and results on the basis of established environmental standards and propose, where necessary, changes, additions or new actions and activities, considering also the progress of services and their capacity to contractual deadlines and resources allocated.

6.5 Construction Phase Environmental Management Plan

The EMP for the construction phase mainly focuses on impacts that are likely to affect the environment, the health and safety of the public as well as the workers during the planning and construction process. Mitigation measures are then proposed to minimize the anticipated impacts. Issues covered by the construction EMP include; Occupational safety and health, air pollution, surface and ground water contamination, noise pollution and traffic impact among others. These are presented in Table 6.1

Table 6.1: Environmental and Social Management Plan for the construction phase

Environment al issues	Action required	Implementation Time frame	Responsible party	Estimated Cost (Kshs)
Impacts of obtaining construction materials	<ul style="list-style-type: none"> If new quarries are done by contractor to obtain rock aggregates, they should be closed and filled up for future use and to minimize health and safety hazards 	At completion of material extraction	Contractor	3,000,000
	<ul style="list-style-type: none"> Re-use excavated soil from the works as fill and for landscaping. 	At construction completion	Contractor	
Traffic Management	<ul style="list-style-type: none"> Sensitize drivers on safe driving and working practices 	Weekly	Contractor's EHS officer	No costs
	<ul style="list-style-type: none"> Avoid transporting materials during periods of peak traffic activity (6.30-8.30am) & after 5.00pm 	Daily	Contractor	No costs
	<ul style="list-style-type: none"> Use of traffic Marshalls to direct and control vehicles at the entrance from main road to the construction site. 	Daily	Contractor	Part of contractor's labour costs
	<ul style="list-style-type: none"> Erect appropriate signage at construction site to guide drivers and heavy equipment operators 	During construction phase	Contractor	200,000
Waste Management	<ul style="list-style-type: none"> The contractor should develop a solid waste management plan for the site 	Construction phase	Contractor aided by EHS Consultant	Part of labour costs
	<ul style="list-style-type: none"> Reduce or re-use wastes to minimize generation of waste 	During construction phase	Contractor's EHS officer	No costs
	<ul style="list-style-type: none"> Wastes that cannot be re-used or recycled should be disposed at Nairobi City Council designated dumping sites 	Daily/Weekly	Contractor's EHS officer	5,000,000

Environmental issues	Action required	Implementation Time frame	Responsible party	Estimated Cost (Kshs)
Waste Management	<ul style="list-style-type: none"> Hazardous wastes, used batteries and tires should be collected for disposal or recycling by NEMA licensed waste handlers 	Throughout the construction phase	Contractor's EHS officer	500,000
	<ul style="list-style-type: none"> All wastes leaving the site should be recorded and tracking documents issued in line with NEMA Waste management Regulations 	Daily through the construction phase	Contractor's EHS officer	No costs
	<ul style="list-style-type: none"> Give priority to material suppliers who provide opportunities to return usable materials such as empty containers 	During construction phase	Contractor's Construction Manager	No costs
	<ul style="list-style-type: none"> The contractor should comply with National Environmental (solid waste management) Regulations 2006. 	During construction phase	Contractor, Contractor's EHS officer	No costs
	<ul style="list-style-type: none"> Provide colour coded solid waste collection bins for waste collection from workers and site offices 	During construction phase	Contractor	300,000
Soil erosion and storm water management	<ul style="list-style-type: none"> Vegetation cover should be removed only where necessary. Re-plant exposed project sites with appropriate vegetation covers 	At start & of construction activities	Construction manager, Contractor's EHS officer	To be determined by the contractor
	<ul style="list-style-type: none"> Excavated materials and stockpiled soils should be covered or kept at appropriate sites to prevent wind erosion 	During construction	Construction manager, Contractor's EHS officer	500,000

Environmental issues	Action required	Implementation Time frame	Responsible party	Estimated Cost (Kshs)
	<ul style="list-style-type: none"> Undertake appropriate soil erosion control measures to manage siltation and clogging of drains during construction phase 	Throughout the construction phase	Contractor, Contractor's EHS officer	To be determined by the contractor
	<ul style="list-style-type: none"> Discharge points of all storm water channels, where flow of water is concentrated should be firmly stabilized. 	Throughout the construction phase	Site civil engineer, Contractor's EHS officer	Part of construction costs
	<ul style="list-style-type: none"> Storm water should be diverted away from the steep gradients as well as temporary stockpiled soil and/ or waste. 	Throughout the construction phase	Site civil engineer, Contractor's EHS officer	Part of construction costs
	<ul style="list-style-type: none"> Efficient and effective storm water management structures should be applied near all storage facilities of chemicals and hazardous material 	Throughout the construction phase	Civil engineer, Contractor's EHS officer	To be determined by the contractor
Surface and underground water pollution	<ul style="list-style-type: none"> Store materials, fuels and chemicals in a specific and secured area to prevent pollution from spillages and leakages. 	Throughout the construction phase	Contractor	Part of construction costs
	<ul style="list-style-type: none"> Provide Oil spill containment kits and cleanup equipment 	Throughout the construction phase	Contractor	500,000
	<ul style="list-style-type: none"> Train drivers and workers on oil and fuel spill control 	At start of construction work	Contractor's EHS officer,	No costs
	<ul style="list-style-type: none"> Waste oil should be disposed off or taken for recycling by a NEMA licensed waste handler. 	Construction period	Contractor's EHS officer	200,000

Environmental issues	Action required	Implementation Time frame	Responsible party	Estimated Cost (Kshs)
	<ul style="list-style-type: none"> Provide adequate toilets at the construction site for use by workers 	Throughout the construction phase	Contractor	1,000,000
Occupational Health and Safety risks	<ul style="list-style-type: none"> Develop a safety and health plan for guiding all workers on safety and health issues at the construction site 	At start of construction phase	Contractor guided by EHS Consultant	Part of construction costs
	<ul style="list-style-type: none"> Constitute a health and safety committee to manage health and safety issues at site 	At start of construction phase	Contractor's EHS officer	No cost
	<ul style="list-style-type: none"> Conduct daily Tool Box Talks with all workers on accident prevention and safe work procedures Provide and display emergency telephone numbers within the site Restrict and control unauthorized access into construction sites to prevent accidents and injuries 	Daily/ throughout construction phase	Contractor's EHS officer	No cost
	<ul style="list-style-type: none"> All machines and other moving parts of equipment must be enclosed to protect all workers from injuries 	Throughout the construction phase	Contractor	To be determined by the contractor
	<ul style="list-style-type: none"> Train some workers on first aid and fire control and management techniques Avail well stocked First Aid Kits at the site and ensure its easily accessible in case of an emergency 	Throughout the construction phase	Contractor	200,000

Environmental issues	Action required	Implementation Time frame	Responsible party	Estimated Cost (Kshs)
	<ul style="list-style-type: none"> • Provide personal safety gears (PPEs) and enforce adherence to their use at all times 	Throughout the construction phase	Contractor	2,000,000
	<ul style="list-style-type: none"> • Train all contractors' workers on the signs and symptoms of COVID-19, how it spreads, how to protect themselves and the need to be tested if they have symptoms • Mandatory provision and use of appropriate Personal Protective Equipment (PPE) and Social distancing among all project personnel and visitors • Provide hand wash facilities, water and soap, alcohol-based hand sanitizer and mandate their use on entry and exit of the project site • Encourage Covid 19 Vaccination among workers and project personnel 	Throughout construction period	Contractor, EHS Officer	1,000,000
Air pollution	<ul style="list-style-type: none"> • Sprinkle water on dusty work areas to minimize dust generation. • Ensure all workers are provided with personal protective gears • Enforce low speed limits for construction vehicles and spray water on dusty roads • Cover sand and loose aggregate materials during transportation to site • Regular servicing and maintenance of machines and vehicles to reduce emission of harmful fumes to the atmosphere 	During construction period	Construction manager, Contractor' EHS officer	Part of construction costs

Environmental issues	Action required	Implementation Time frame	Responsible party	Estimated Cost (Kshs)
Noise Pollution	<ul style="list-style-type: none"> • Device appropriate noise mitigation measures e.g. use of acoustic barriers around noisy equipment • Provide personal protective (PPEs) equipment to workers working in noisy areas • Track drivers to avoid hooting and revving of engines where unnecessary • All equipment and vehicles on the site should be properly serviced and maintained to reduce noise. 	During construction period	Construction Manager, EHS officer	Part of construction costs
Site Security	<ul style="list-style-type: none"> • The contractor, workers and suppliers should strictly follow security rules and procedures put in place by KDF • Conduct thorough vetting for all workers to avoid criminal elements infiltrating the site • Proper screening and manning of entry points to the site • Conduct random and regular security patrols around the construction site • Install CCTV at storage, work stations and other sensitive areas at the site 	Construction period	KDF security team, Contractor's security guards	KDF to use their own security team
Increased water demand	<ul style="list-style-type: none"> • Conduct daily inspections to ensure that water is used efficiently at the site by sensitizing construction staff to avoid irresponsible water use. • Fix any water leaks from damaged pipes and faulty taps • Utilize water from other alternative sources e.g. from existing borehole or water harvested from rain 	Construction period	KDF, Contractor	Part of construction costs

Environmental issues	Action required	Implementation Time frame	Responsible party	Estimated Cost (Kshs)
Increased energy demand	<ul style="list-style-type: none"> • Employ the use of energy saving bulbs at the site; • Install security lights with sensors to save on energy during the night • Switch off all electrical equipment when not in use to save energy • Install alternative energy sources such as solar power • Monitor and keep records of energy use for better decision making 	Construction period	KDF, Contractor	Part of construction costs
Socio – economic impacts	<ul style="list-style-type: none"> • Give priority to locals when hiring workers for the project during construction • Ensure gender balance in employment as far as possible. • Provide business opportunities for local suppliers and service providers • Implement HIV/AIDS and STD awareness and prevention programme for workers and local residents targeting risk groups • Constitute a Grievance Redress Mechanism to handle social conflicts related to the project 	During construction	KDF, Contractor	Not applicable
Total				14,400,000/=

6.6 Operation phase Environmental Management Plan

Operation phase EMP proposes measures that should be undertaken to minimize adverse impacts that are likely to result from operation activities of the project. The following issues have been identified and mitigation measures proposed as shown in Table 6.2.

Table 6.2: Operational phase Environmental Management plan

Environmental issues	Action required	Responsible party	Estimated Cost (Kshs)	Time frame
Noise and vibrations pollution control	<ul style="list-style-type: none"> • Proper maintenance and servicing of equipment and machinery used during the operation phase. • Use of warning signs for speed limits, hooting and levying of engines • Noise level measurements should be carried out on individual equipment to detect increases in noise levels. • All activities on the site must abide by the National and International Laws that govern noise levels. 	Contractor, KDF	To be determined by KDF	Operational phase
Air pollution	<ul style="list-style-type: none"> • Formulate an emission control plan for the hospital • Install air quality equipment and systems that shall enable continuous monitoring • Regular servicing and maintenance of ground equipment and machines to control excessive exhaust fumes 	KDF	To be determined by KDF	Operation phase

Environmental issues	Action required	Responsible party	Estimated Cost (Kshs)	Time frame
Waste Management	<ul style="list-style-type: none"> • Develop a waste management plan for the hospital and adhere to EMCA solid waste management regulations 2006 • Waste should be sorted and segregated at source for easy of management • Provide adequate infrastructure for waste collection and transfer points before disposal (bins, holding containers etc.) • Contract a NEMA licensed solid waste handler to collect, transport and dispose waste from the hospital • Track all waste generated from the hospital for disposal • Effective waste management practices that involves 3Rs (reduce, re-use, recycle) should be put in place during the construction and operation phase. • Biomedical, pathological wastes should be incinerated at site or disposed of by licensed waste handler • Train staff on the storage, management and disposal of radioactive wastes in accordance to national and international standards • Radioactive wastes should be stored in lead box that has symbol of radioactive waste mark on it. • Medical/contagious waste should be stored in a refrigerated storage at +4 ° C temporarily in marked containers such as red bags with infection symbol before sterilization. 	KDF management	To be determined by KDF Management	Operation phase

Environmental issues	Action required	Responsible party	Estimated Cost (Kshs)	Time frame
<p>Water and soil pollution</p>	<ul style="list-style-type: none"> • Install oil and grease interceptors at car wash areas and petrol station and service bays • Regular checks and maintenance of oil interceptors and grit traps • Hazardous materials should be kept on secure platform to avoid contamination with storm water runoff • Employ standard best practices in fuel refueling, storage and handling to prevent the risk of spillages. • Oil spill containment and cleanup equipment should be kept at the contractor's yard with a small kit in every project vehicle • All such materials, fuels and chemicals must be stored in a specific and secured area to prevent pollution from spillages and leakages. The basic NEMA regulations of hazardous waste management must be applied fully. • All drain pipes passing under building, driveway or parking should be of heavy duty PVC pipe tube encased in 150mm concrete surround • Provide bins for construction workers at appropriate positions for disposal of litter 	<p>KDF Management</p>	<p>To be determined</p>	<p>Regularly</p>

Environmental issues	Action required	Responsible party	Estimated Cost (Kshs)	Time frame
Storm water management	<ul style="list-style-type: none"> • Conduct regular checks and unclog or de-silt blocked drainage channels within the hospital • Regular repair and maintenance of drainage out falls to prevent soil erosion 	KDF Management	To be determined as need arises	Operation phase
Increased water demand	<ul style="list-style-type: none"> • Install water conserving automatic taps and toilets. • Fix any water leaks from damaged pipes and faulty taps • Install water conserving automatic taps and efficient toilets flushes. • Consider alternative water sources such as rain water harvesting 	KDF	To be determined	Operation phase
Increased energy demand	<ul style="list-style-type: none"> • Employ the use of energy saving bulbs at the premises; • Install security lights with sensors to save on energy during the night • Switch off all electrical equipment when not in use to save energy • Monitor and keep records of energy use. Undertake yearly energy audits on all types of energy usage in the facility for better decision making on energy conservation 	KDF	To be determined by KDF	Operation phase

Environmental issues	Action required	Responsible party	Estimated Cost (Kshs)	Time frame
Occupational Health and Safety	<ul style="list-style-type: none"> • Constitute a health and safety committee to manage health and safety issues at the hospital • Formulate an Emergency Response Plan for the hospital to assist staff and emergency response teams during fire emergency • Enhance measures to screen and control infectious diseases such as Covid 19 disease • Install fire detection and alarm systems including communication and public address systems to detect a fire and alert the building staff, emergency response teams, occupants and other fire response units. • Provide adequate automatic and manual fire suppression and control equipment, such as automatic sprinkler systems, manual portable extinguishers, and fire hose reels. • Regular servicing and testing of fire-fighting equipment and facilities to ensure they function properly at all times and as required by law 	KDF	To be determined	During operation period
Total			To be determined by KDF management	

6.7 Environmental and Social Management Plan (ESMP) for Associated Facilities

These facilities include WWTP, Incinerator, Batching Plant and Mortuary

6.7.1 EMP for Waste Water Treatment Plant

Table 6.3: EMP for Waste Water Treatment Plant

Impact	Mitigation measures	Timeframe	Responsibility	Estimated cost (Ksh)
Construction Phase				
Noise and dust pollution, generation of wastes	<ul style="list-style-type: none"> Refer to mitigation measures in the general construction EMP 	Construction period	Contractor” EHS officer	Part of construction costs
Infiltration of wastewater into soil, aquifer or water supply and impact on drinking water quality	<ul style="list-style-type: none"> Construct WWTP with high quality materials and in accordance to the design engineer’s standards to prevent leakages. 	Construction	Contractor	Part of construction costs
Operation phase				
Odours and air pollution from the plant and sludge.	<ul style="list-style-type: none"> Maintaining proper operations and maintenance practices such as sewer inspections and management to avoid odours Minimize hydraulic detention times in pipes and wet wells Cover emission points (e.g., manholes) 	Operation Phase	Proponent (KDF)	Part of operation costs

Impact	Mitigation measures	Timeframe	Responsibility	Estimated cost (Ksh)
	<ul style="list-style-type: none"> • Clear and unclog blocked wastewater/sewer lines within the shortest time possible to contain sewage spills and overflows 			
Exposure to Chemical Hazards	<ul style="list-style-type: none"> • Train WWTP operators in safe handling of waste water treatment chemicals and emergency response procedures • Provide appropriate personal protective equipment for use by WWTP workers • Install safety showers and eye wash stations near areas where hazardous chemicals are stored or used 	Operation Phase	Proponent	To be determined by the proponent
Physical hazards and safety	<ul style="list-style-type: none"> • Erect perimeter fence around waste water treatment plant to restrict access and prevent physical injuries • Post security guards to secure the site. • Provide emergency rescue facilities such rescue buoys and throw bags and train workers on how to use them in case of an emergency • Provide adequate security lighting around the WWTP 	Operation Phase	Proponent	To be determined by the proponent
Solid waste disposal of sludge and other wastes.	<ul style="list-style-type: none"> • Sludge from the WWTP shall be removed once every 2-3 years • Test and determine quality of sludge to guide disposal 	Every 2 years	Proponent	To be determined by the proponent

6.7.2 Environmental Management Plan for Incinerator

Table 6.4: Environmental Management Plan for Incinerator

Impact	Mitigation measures	Timeframe	Responsibility	Estimated Cost (Ksh.)
Air Pollution	<ul style="list-style-type: none"> Cleaning of the combustion chamber and de-clogging of air flows and fuel burners should be done as scheduled. 	According to maintenance schedules	KDF	To be determined by the proponent
	<ul style="list-style-type: none"> Routine inspections of the furnace and air pollution control systems should be undertaken 	According to manufacturer's guidelines	KDF, National Inspectorate Department	To be determined by the proponent
	<ul style="list-style-type: none"> Monitoring of incinerator emissions should be undertaken and should comply with national standards and or in accordance to the Stockholm convention on persistent Organic Pollutants 	Daily/weekly/semi-continuous	KDF	500,000
Generation of hazardous Ash	<ul style="list-style-type: none"> Ash should be handled, transported (using covered hauling) and disposed of in an environmentally friendly manner 	Weekly/Bi-weekly during operation period	KDF	To be determined by the proponent
	<ul style="list-style-type: none"> Disposal should be done in safe dedicated landfills (e.g., landfilling in double-walled containers, solidification, or thermal post-treatment) 	Operation period	KDF	To be determined by the proponent

Impact	Mitigation measures	Timeframe	Responsibility	Estimated Cost (Ksh.)
Health & Safety Risks operators	<ul style="list-style-type: none"> The incinerator should be operated by well trained and qualified personnel 	Operation period	KDF	To be determined by the proponent
	<ul style="list-style-type: none"> Undertake bi-annual medication tests for incinerator operators 	Once every 6 months	KDF	Utilize hospital insurance health cover for workers
	<ul style="list-style-type: none"> Provide adequate personal protection equipment (PPEs) such as Gloves, Boots, Overalls, Aprons, goggles, mouth respirators, helmets 	Throughout operation phase	KDF	To be determined by proponent
	<ul style="list-style-type: none"> Do not allow unauthorized persons to enter the incinerator area during periods of incineration 	Throughout operation phase	Operation personnel	Part of labour costs
Total Cost (Ksh)				500,000

6.7.3 Environmental Management Plan for Batching Plant

Table 6.5: Environmental Management Plan for Batching Plant

Impact	Mitigation Measures	Time Frame	Responsibility	Estimated Cost (Ksh)
Excessive emission of dust	<ul style="list-style-type: none"> Transport sand and aggregate in trucks with enclosed top covers Transport damp sand and aggregate or wet on receipt, to avoid dust dispersal during unloading Transport cement and SCM in fully enclosed containment system 	Throughout the construction phase	Contractor	Part of construction cost

Impact	Mitigation Measures	Time Frame	Responsibility	Estimated Cost (Ksh)
	<ul style="list-style-type: none"> • Store sand & aggregates at bays enclosed on three sides by solid walls • Install additional screening over and above wall height of the bays as required (e.g. shade cloth) • Ensure bays are fitted with functional, well-maintained, effective sprinkler systems to suppress dust • Bays - stockpiles kept at least 0.5 m below the top of walls and 0.5m inside open end of bays • Post signage “Do not overfill” the bays instructing staff • Install emergency pressure alert/overflow protection systems • Fit the batching plant with high quality dust filters 	Throughout the construction phase	Contractor, Plant Operator, EHS officer	Part of construction cost
Noise generation	<ul style="list-style-type: none"> • All pumps and electric motors should be enclosed • All compressors enclosed, where it is safe to do so without causing over heating • All pressure-operated equipment and engines should be fitted with silencing/muffling devices • Use of sound-absorbing materials (at point source) • Install sound-barriers and buffers between plant and other facilities • Regular good practice maintenance of all equipment, heavy machinery and trucks and maintenance records kept 	Construction period	Contractor, Contractor’s Mechanical engineer	Part of construction cost
Waste water management	<ul style="list-style-type: none"> • All process water from concrete manufacture should be recycled back into production via a fully integrated system including, collection, reclamation, capacity storage, and re-use • Process water recycling system should be fully isolated from storm water drains 	Throughout the construction phase	Contractor	Part of construction cost

Impact	Mitigation Measures	Time Frame	Responsibility	Estimated Cost (Ksh)
	<ul style="list-style-type: none"> Construct storage tank to store reclaimed process water that can contain first flush, contaminated water capture following rain events 			
Hazardous waste management	<ul style="list-style-type: none"> Store chemicals and fuel in a roofed impervious solid walled bunded area Construct chemical storage area away from storm water or recycled water or rain entry Avail Chemical spill kits on site that can be easily accessed and trained staff in their use Secure the batching plant from unauthorized access 	Throughout the construction phase	Contractor	Part of construction cost

6.7.4 Environmental Management Plan for the Hospital Mortuary

Table 6.6: Environmental Management Plan for the Mortuary

Impact	Mitigation Measures	Implementation Period	Responsibility	Estimated Cost (Ksh)
Construction Phase				
Waste generation, Noise and Air pollution, OHS impacts	Refer to Construction EMP for mitigation measures	Construction period	Contractor, EHS Officer	Part of construction
Operation Phase				
	Install automatic temperature monitors with alarm to alert in-case of refrigeration system failure.	Operation phase	Proponent	50,000
	Embalm all bodies before storage in order to prevent them from rotting	Case by case basis	Proponent	7,000 per body
	The exhaust air shall be discharged to atmosphere such that it cannot be drawn back into the	Operation phase	Proponent	To be determined by the proponent

Impact	Mitigation Measures	Implementation Period	Responsibility	Estimated Cost (Ksh)
Air Pollution	mortuary, any other ventilation inlet, or any indoor portion of the hospital			
	Dispose wastes regularly and appropriately to prevent wastes from decomposing at collection areas	Daily	Cleaners and waste management workers	Part of institution's waste management costs
	Provide all workers in areas where air quality is compromised with appropriate PPEs	Monthly	Proponent	5000 per person
	Air extracted from the mortuary shall not be used for energy recovery or recirculation	Operation phase	Proponent	No cost
Waste Generation	Provide adequate bins for general waste collection	Yearly	Proponent	50,000
	Sort and segregate waste before storage, treatment and disposal	Daily	proponent	To be determined
	Biomedical wastes should be disposed of as outlined in the operation phase EMP	Operation phase	Proponent	To be determined
	Provide facilities for refrigeration of certain types of wastes before disposal	At inception	Proponent	200,000
	Vehicles that have been contaminated with decomposed bodies or body fluids shall be washed in special area and discharge channeled to WWTP.	During operation period	The proponent	To be determined by the proponent
Occupational Health and safety risks	Train personnel handling infectious wastes on safety and proper management twice a year	Operation phase	Proponent	5,000 per personnel
	Provide all workers handling wastes with appropriate PPE to reduce accidental injuries and infections	Operation phase	Proponent	To be determined by the proponent
	Sharps should not be re-used	Operation phase	All workers	No cost
	Use proper method for sterilization of equipment at autopsy rooms	Operation phase	Autopsy workers	Part of operational costs
	Store biomedical wastes in special containers designed for storing such wastes	Operation phase	Proponent	Part of operational costs

Impact	Mitigation Measures	Implementation Period	Responsibility	Estimated Cost (Ksh)
	All external ventilation openings shall be fly and vermin-proof	Operation phase	Contractor, Proponent	Part of construction costs
	Keep first Aid Kits at the mortuary in-case of injury	Operation phase	Proponent	50,000
High energy demand	Use energy saving bulbs	Operation phase	Contractor	To be determined by the proponent
	Install alternative sources of energy such as solar power for lighting	Construction/ Operation phase	Proponent, contractor	1,000,000
	Switch off lights when not in use	Operation phase	All workers	No cost
	Total Cost (KSh)			1,367,000

6.8 Environmental Monitoring

6.8.1 General

Environmental monitoring and audits are essential in Project's life span as they are conducted to establish if project implementation has complied with set environmental management standards for Kenya as spelt out in EMCA 1999 and the Environmental (Impact Assessment) and Audit Regulations 2003. In this Project, environmental monitoring and audit will be conducted to ensure that identified potential negative impacts are mitigated during the project's implementation, operation and decommissioning periods. The key objectives of monitoring are:

- (i) To ensure that the ESMP is implemented;
- (ii) To evaluate the effectiveness of the mitigation measures;
- (iii) To verify predicted impacts;
- (iv) To provide feedback to licensing authorities.

Environmental concerns, that will be monitored and audited during the project's construction and operation period include: water quality, air Pollution, occupational health and safety issues (including worker accidents and hazards), soil erosion, Socio-cultural changes; and socio-economic benefits.

6.8.2 Project parameters to be monitored

The EMCA 1999 require the project proponent to prepare and undertake a monitoring plan and regular auditing. Monitoring is needed to check if and to what extent the impacts are mitigated, benefits enhanced and new problems addressed. Table 6.7 present the various project parameters to be monitored.

Table 6.7: Monitoring plan

Monitoring Parameters	Responsibility	Monitoring Location(s)	Time/Frequency	Indicators
Condition of machinery and equipment	Contractor, KDF	At work stations	Weekly	Service, maintenance, repair or replacement records of faulty machines
Training on safety and health	Contractor, KDF	At work stations	At onset of construction and operation	Records of first aid, fire management training
Accidents, incidents, injuries etc.	Contractor, KDF	At work stations	Daily	Mitigation/prevention measures in place, PPEs, Records of incidents or accidents, Medical records,

Monitoring Parameters	Responsibility	Monitoring Location(s)	Time/Frequency	Indicators
				Training , First Aid kits; Fire extinguishers
Dust emissions	Contractor, KDF	At work stations	Daily - construction	Health safety measures in place
Noise emissions	Contractor, KDF	At work stations	During construction and operation	Noise level measurement and monitoring records, Noise reduction strategies in place
Sanitation and welfare facilities	Contractor,	Workers camps, construction sites and site offices	Weekly	Presence of sanitation & welfare facilities
Oil spills and leakages	Contractor	Workers camps and construction sites	Daily	Records of daily inspections
Solid Wastes	Contractor, KDF	Workers camps, construction sites and hospital terminal offices	Daily/weekly	Inspection and waste disposal records
Traffic management	Contractor	At construction sites	Daily	Records of driver and vehicle activities Follow management plan
Ambient air quality	KDF	During operation	Sampling every 3 months	Sampling and measurement records

6.8.3 Effluent discharge Monitoring into Public sewers

The Environmental Management Coordination (Water Quality) Regulations 2006 stipulate guidelines for effluent discharge into public sewers. The proponent shall be required to undertake monitoring of the various parameters as indicated in Table 6.8 so as to comply with the regulations. Samples shall be taken daily and tested for maximum levels permissible.

Table 6.8: Standards for effluent discharge into Public sewers

I	PARAMETER	Maximum levels permissible
	Suspended solids (mg/L)	250
	Total dissolved solids (mg/L)	2000
	Temperature °C	20 - 35
	pH	6-9
	Oil and Grease (mg/L) -where conventional treatment shall be used	10
	Oil and Grease (mg/L)- where ponds is a final treatment method	5
	Ammonia Nitrogen (mg/L)	20
	Substances with an obnoxious smell	Shall not be discharged into the sewers
	Biological Oxygen Demand BOD ₅ days at 20 °C (mg/L)	500
	Chemical Oxygen Demand COD (mg/L)	1000
	Arsenic (mg/L)	0.02
	Mercury (mg/L)	0.05
	Lead (mg/L)	1.0
	Cadmium (mg/L)	0.5
	Chromium VI (mg/L)	0.05
	Chromium (Total) (mg/L)	2.0
	Copper (mg/L)	1.0
	Zinc (mg/L)	5.0
	Selenium (mg/L)	0.2
	Nickel (mg/L)	3.0
	Nitrates (mg/L)	20
	Phosphates (mg/L)	30
	Cyanide Total (mg/L)	2
	Sulphide (mg/L)	2
	Phenols (mg/L)	10
	Detergents (mg/L)	15
	Colour	Less than 40 Hazen units
	Alkyl Mercury	Not Detectable (nd)
	Free and saline Ammonia as N (mg/L)	4.0
	Calcium Carbide	Nil
	Chloroform	Nil
	Inflammable solvents	Nil
	Radioactive residues	Nil
	Degreasing solvents of mono-di-trichloroethylene type	Nil

(Source: EMC Water Quality Regulations 2006)

6.8.4 Incinerator Monitoring (Air Emissions)

- Air emissions from incinerators should be monitored according to the manufacturer's guidelines and industry best practices. Routine monitoring of CO, oxygen, particulate matter, HCl, SO₂, NO₂, HF, air flows, temperatures, pressure drops, and pH should be undertaken.
- Periodic or semi-continuous measurement of: polychlorinated dioxins and furan

Table 6.9: Incinerator Monitoring Guidelines

Pollutant	Units	US EPA emission limits			EU emission limits		
		Small	Medium	Large	Daily average	0.5-hour average	0.5-8 hour average
Particulates	mg/m ³	50	17	14	10	10, 30	
CO	mg/m ³	18	1.6	9.8	50	100, 100	
Dioxins/furans	ng TEQ /m ³	0.0099	0.011	0.027			0.1
HCl	mg/m ³	17	8.9	5.9	10	10, 60	
SO ₂	mg/m ³	2.8	2.8	16	50	50, 200	
Mercury	mg/m ³	0.011	0.0027	0.00099			0.05
Lead	mg/m ³	0.24	0.014	0.00053			

(Source; GEF - Global Health Care Waste Project)

CHAPTER 7

7. STAKEHOLDER ENGAGEMENT ACTIVITIES UNDERTAKEN AND FUTURE PLANS

7.1 Introduction

Stakeholder engagement through Public consultation and participation is a fundamental principle of the EIA process which contributes to EIA studies and to the successful design, implementation, operation and management of proposed projects. The main objective of stakeholder engagement is to ensure inclusivity of all the parties (stakeholders, PAPs, interested parties) in the decision making and the subsequent roll out of the project. It also strives to ensure acceptability of the proposed project. Stakeholder engagement is purposely meant to create public information disclosure as well as a consultation process that will influence the project. The approach is geared toward enhancing communications between the project proponent and the public, by actively engaging individuals, organizations and groups who have a stake in the project activities and outcomes.

The Kenya government has enshrined the need for human societies' involvement in project development per the 2010 Constitution. This has been set out in the *EMCA 1999 (amendment 2015)* and *Environmental (Impact and Audit) Regulations, 2003*. Community consultation and participation ensures that communities and stakeholders are part and parcel of the proposed developments and in so doing assures the sustainable use of resources. It has also demonstrated successfully that projects that go through this process will acquire high level of acceptance and accrue benefits to a wider section of the society. Public consultations form a useful component for gathering, understanding and establishing likely impacts of projects determining community and individual preferences and selecting alternatives. As a result, a stakeholder Engagement Plan (SEP) setting out the overarching principles, approach and a detailed action plan for ESIA engagement was developed. The SEP was used as a tool for identifying and prioritizing stakeholders, and for engaging those stakeholders as part of the ESIA process

7.2 Public Consultation Framework Adopted

Stakeholder engagement & Disclosure was achieved in form of survey questionnaires, direct interviews, a public meeting and through the media.

7.2.1 Direct one on one interviews

Direct interviews were used where necessary, to get responses from the proponent, project architects and the contractor. These will range from discussions about the proposed project designs, waste management, alternative technology and sites, among other related issues.

Other stakeholders such as area residents and local administration were interviewed to provide background and baseline information on the project.

7.2.2 Questionnaire administration

Open ended questionnaires were administered to collect the views of various stakeholders. The questionnaires were used to capture the respondent’s views in terms of the positive and negative impacts that they anticipate from the project and suggested mitigation measures.

The recommendations from the public consultations were incorporated in the proposed mitigation measures in the ESIA study report.

7.2.3 Public Consultation Meeting

The proponent through public meetings did disclose the project details and its anticipated impacts and benefits to the stakeholders in-order for them to give their oral or written comments / opinions on the development. All issues discussed were recorded and discussed in the EIA study report. Questionnaires were also administered among the participants and formed part of the appendices of the ESIA study report.

7.2.4 Media

The proponent shall also put up public notices on the proposed project in two newspapers, the Kenya Gazette and over the radio to ensure wide public disclosure.

7.3 Stakeholders Mapping

A number of stakeholders have been identified to participate in the public consultation meeting. The stakeholders have been divided into 4 broad groups. They include:

Table 1 Identified stakeholders

Government Authorities	<ol style="list-style-type: none"> 1. Ministry of Defense 2. Ministry of Health 3. Ministry of Transport, Infrastructure, Housing, Urban Development and Public Works 4. KeNHA 5. KURA 6. Nairobi County Government (Dept. of Environment, Energy, Water and Sanitation) 7. Nairobi Metropolitan Services 8. KALRO Kabete/KARI 9. Kenya Nuclear Regulatory Authority 10. NEMA
Political Leaders & Government officials	<ol style="list-style-type: none"> 1. Westlands Constituency MP 2. Highridge Ward MCA 3. Highridge Ward Administrator

	<ol style="list-style-type: none"> 4. Highridge Location Chief 5. Nairobi County Commissioner 6. Deputy County Commissioner – Westlands Sub-county
Affected communities	<ol style="list-style-type: none"> 1. General public 2. Residents Associations of:- <ul style="list-style-type: none"> • Kyuna Estate • Spring Valley Estate • Muguga Green Estate • Kibarage Estate 3. Youths in the area 4. Job seekers
Commercial organisations	<ol style="list-style-type: none"> 1. Local businesses 2. ABC Place 3. PKF Kenya - Nairobi
Church, Civil society & development agencies	<ol style="list-style-type: none"> 1. Association for the Physically Disabled of Kenya – APDK/Nairobi Council for Persons with Disability 2. Academic centres e.g. Nairobi School, Montessori Learning Centre 3. Religious Centres e.g. St Austin Catholic Church

Stakeholder Engagement is a key part of this ESIA process. One of the key aims of the stakeholder engagement process is to ensure that all relevant stakeholders are provided with the opportunity to express their concerns and opinions and in turn have them reflected in the Environmental and Social Management Plan. The stakeholder engagement process also provides NEMA with the necessary information to assist it in making an informed decision about the project. ***It's envisaged that the stakeholder engagement process shall be a continuous exercise throughout the Project lifecycle.***

The specific objectives of the stakeholder engagement process included;

- ✓ Facilitating consideration of alternatives, mitigation measures and trade-offs (if any);
- ✓ Ensuring that important impacts are not overlooked and benefits are maximized;
- ✓ Reducing chances of conflicts through early identification of contentious issues; and
- ✓ Providing an opportunity for stakeholders to influence the Project design and operational plan in a positive manner;

Stakeholder identification and mapping happened organically for key stakeholder groups, and a rigorous analysis was undertaken to ensure that no stakeholder was left out. The key stakeholder groups informed and consulted about the project include person or group who:

- ✓ Are directly and/or indirectly affected by the Project implementation (positively or negatively); and

- ✓ Have an ‘interest’ in the Project;

Among the identified stakeholders were members of the uniformed forces drawn from various Government Security Agencies such as but not limited to:

- Kenya Defense Forces (KDF)
- National Intelligence Service (NIS)
- Kenya Police
- Kenya Prison
- Administration Police (AP)
- Kenya Forest Service (KFS)
- Kenya Wildlife Services (KWS)
- National Youth Services (NYS)

NB: Stakeholder engagement was undertaken between personnel drawn in High Command or their Representatives from the various Government Security Agencies who played a critical role in Project design and operational plan.



Representatives of the Various Government Security Agencies



CHAPTER 8

8. Grievance Redress Mechanism

8.1 Introduction

A Grievance Management Procedure will be established to ensure that all stakeholders have a channel through which they can air their concerns and complaints. The proposed project does not involve relocation or involuntary resettlement. Neither are there any private public properties to be affected since the land belongs to KDF. Therefore, it's envisaged that the proposed project may only be associated with occupational health and environmental issues such as dust emission or noise emissions. Grievances can be communicated to KDF either verbally or through a written form. KDF will undertake to create a register of all community grievances that will be raised and how they were addressed.

It is also important to note that contractor will be required to develop a separate grievance management procedure for employees during construction. The proponent will also be required to develop a grievance mechanism for patients during the operation phase

8.2 Grievance Process

The Neighbouring residents already have a structured way of communicating and handling any issue of conflict concerning their area of residence. They have a functional formation known as Estate Residential Association. The association comprises of elected leaders, secretary and treasurer. Any complaints from the members are usually channeled through their leaders. The area of jurisdiction for the association is to the North of the project area.

The proponent will appoint a specific committee and a site based liaison officer to deal with any grievances from the community. The Association and unrepresented members shall be informed about the grievance management system through planned consultations with the community. All grievances will be recorded, responded and resolved in a defined timeframe.

Grievances can be submitted via face-to-face contact, mail, or e-mail during the construction and operation stages. The procedure to handle grievances include consideration of all grievances submitted in verbally and written recording/filing, evaluation of the grievances in a timely manner, and informing the complainant about the corrective actions to be taken to manage the grievance.

Any grievance related to subcontractors' activities will also be managed in line with the same grievance mechanism. During the operation phase the proponent is advised to establish a call center with hotline where complaints can easily be received and handled. The figure below gives a sketch of the planned grievance process.

CHAPTER 9

9. DECOMMISSIONING

9.1 Introduction

Decommissioning normally takes place both at the end of construction period and during the final phase of a project life-cycle. Environmental planning is therefore necessary before any decommissioning activities should be allowed to commence. The reason for this is because a project earmarked for decommissioning has in all likelihood been operational for some time, and as such, the environment within which it lies has stabilised in response to the presence of the associated infrastructure, activities and facilities. At the end of construction phase, decommissioning mainly targets temporary facilities associated with construction camps and site restorations. The decommissioning of one or all components of the proposed project will therefore have some effect on the environmental status quo of the project site, either in a positive or in a negative way.

9.2 Purpose and objectives of decommissioning

The purpose of decommissioning is the release of valuable assets such as machinery and sites for alternative use, recycling and reuse of materials and the restoration of environmental amenity. In all cases, the basic objective is to achieve an end-point that is sensible in technical, social and financial terms, that properly protects workers, the public and the environment and, in summary, complies with the basic principles of sustainable development. Stringent regulatory controls protect the public, the environment and workers from the hazards associated with decommissioning activities.

9.3 Decommissioning at the end of construction phase

9.3.1 General

The construction process at the proposed project site will involve a number of activities which may contribute to some changes in the local environmental conditions. Activities associated with site construction process and which may have some impact on local environment include acquisition and transportation of construction materials, equipment, vehicles and personnel to the site. Construction process will involve excavation and piling of soil which may negatively affect the local environmental conditions.

9.3.2 Decommissioning and site restoration activities

The decommissioning exercise will involve dismantling of site facilities; backfilling all disturbed areas and transportation of materials out of site for disposal or re- use in similar future projects.

9.3.3 Demolition and disposal of materials from the construction site

The contractor shall undertake demolition activities during project implementation and at the end of construction period. The KDF soldier’s camp, the Contractors Camp and the current temporary KDF offices shall be demolished to pave way for other planned structures. Materials from the site will basically include excavated soils, scrap metal, iron sheets, concrete blocks, debris and metal pipes among others. These materials can be reused, exchanged, recycled and donated to other organizations. Scrap materials, can often be reused or refurbished. Some items could be used by KDF in their operations, and many items can be sold to for recycling. Various items should be accumulated separately to facilitate recycling. The table below gives a summary of mitigation measures proposed for decommissioning during construction stage.

Mitigation measures for dust emissions, excessive noise, waste generation and occupational health and safety have been discussed in the construction environmental management plan and are applicable to decommissioning phase.

Table 9.1: Decommissioning at the end of construction phase

Activity/ Issues	Recommended mitigation measures
Spoil disposal	<ul style="list-style-type: none"> • Maximize the re-use of all excavated materials in the works • Dispose of spoil only at designated sites and by approved methods; methods must consider topsoil conservation and quality, long-term soil stability, erosion and floodwaters.
Waste Management and Pollution	<ul style="list-style-type: none"> • Design and implement formal site waste management plan. • Apply best practice and standard operating procedures (SOPs) to minimize risk of spills (including secondary containment of fuel dispensing areas and vehicle maintenance on concrete pads with oil and grease traps). • Collect, sort and store all pieces of metals scattered within the site in a special area pending disposal to scrap metal dealers
Dust nuisance	<ul style="list-style-type: none"> • Identify dust-sensitive locations on all unpaved roads and access tracks leading to the site and establish and enforce maximum vehicle speeds of 10km/h through these roads.

	<ul style="list-style-type: none"> • Spray water to surfaces planned for demolition to minimize dust emissions
Hazards to workers	<ul style="list-style-type: none"> • Workers should be properly supervised to avoid injuries and accidents during demolition. • All the provisions of the Occupational, Health and Safety Act 2007 shall be applied.
	<ul style="list-style-type: none"> • Sensitize workers on handling and working in hazardous areas.

9.4 Decommissioning at the end of project life cycle

Decommissioning of hospitals is not usually possible due to lack of alternative sites with expansive space and the costs associated with setting up new infrastructure. However, should decommissioning be required, the KDF management will be required to draw a detailed decommissioning master plan. Such plan should address all environmental and socio-economic impacts associated with decommissioning. An EIA report for decommissioning would then be prepared and submitted to NEMA. A license shall then be issued stipulating the terms and conditions to be followed during decommissioning.

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ATTACHMENTS TO THE REPORT

Attachment 1: Ambient Air Quality Monitoring Report

Attachment 2: Ambient Noise Level Monitoring Report

Attachment 3: Labour Management Plan

Attachment 4: Traffic Impact Assessment Report